Mathematics

Effective November 2021
Rule 6A-1.09412, F.A.C.

Foundational Skills in Mathematics K-2 (#5012005) 2019 - 2022 (current)

Course Standards

Name	Description
MAFS.1.G.1.1:	Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size); build and draw shapes to possess defining attributes.
MAFS.1.G.1.2:	Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape.
MAFS.1.G.1.3:	Partition circles and rectangles into two and four equal shares, describe the shares using the words *halves*, *fourths*, and *quarters*, and use the phrases *half of*, *fourth of*, and *quarter of*. Describe the whole as two of, or four of the shares. Understand for these examples that decomposing into more equal shares creates smaller shares.
MAFS.1.MD.1.1:	Order three objects by length; compare the lengths of two objects indirectly by using a third object.
MAFS.1.MD.1.a:	Understand how to use a ruler to measure length to the nearest inch. a. Recognize that the ruler is a tool that can be used to measure the attribute of length. b. Understand the importance of the zero point and end point and that the length measure is the span between two points. c. Recognize that the units marked on a ruler have equal length intervals and fit together with no gaps or overlaps. These equal interval distances can be counted to determine the overall length of an object.
MAFS.1.MD.2.3:	Tell and write time in hours and half-hours using analog and digital clocks.
MAFS.1.MD.2.a:	Identify and combine values of money in cents up to one dollar working with a single unit of currency[1]. a. Identify the value of coins (pennies, nickels, dimes, quarters). b. Compute the value of combinations of coins (pennies and/or dimes). c. Relate the value of pennies, dimes, and quarters to the dollar (e.g., There are 100 pennies *or* ten dimes *or* four quarters in one dollar.) ([1]Students are not expected to understand the decimal notation for combinations of dollars and cents.)
MAFS.1.MD.3.4:	Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.
MAFS.1.NBT.1.1:	Count to 120, starting at any number less than 120. In this range, read and write numerals and represent a number of objects with a written numeral.
MAFS.1.NBT.2.2:	Understand that the two digits of a two-digit number represent amounts of tens and ones. a. 10 can be thought of as a bundle of ten ones — called a "ten." b. The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones. c. The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones). d. Decompose two-digit numbers in multiple ways (e.g., 64 can be decomposed into 6 tens and 4 ones or into 5 tens and 14 ones).
MAFS.1.NBT.2.3:	Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols >, =, and <.
MAFS.1.NBT.3.4:	Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten.
MAFS.1.NBT.3.5:	Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used.
MAFS.1.NBT.3.6:	Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or zero differences), using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.
MAFS.1.OA.1.1:	Use addition and subtraction within 20 to solve word problems[1] involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem ([1]Students are not required to independently read the word problems.)
MAFS.1.OA.1.2:	Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.
MAFS.1.OA.2.3:	Apply properties of operations as strategies to add and subtract. *Examples: If 8 + 3 = 11 is known, then 3 + 8 = 11 is also known. (Commutative property of addition.) To add 2 + 6 + 4, the second two numbers can be added to make a ten, so 2 + 6 + 4 = 2 + 10 = 12. (Associative property of addition.)*
MAFS.1.OA.2.4:	Understand subtraction as an unknown-addend problem. *For example, subtract 10 – 8 by finding the number that makes 10 when added to 8.*
MAFS.1.OA.3.5:	Relate counting to addition and subtraction (e.g., by counting on 2 to add 2).
MAFS.1.OA.3.6:	Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., 8 + 6 = 8 + 2 + 4 = 10 + 4 = 14); decomposing a number leading to a ten (e.g., 13 – 4 = 13 – 3 – 1 = 10 – 1 = 9); using the relationship between addition and subtraction (e.g., knowing that 8 + 4 = 12, one knows 12 – 8 = 4); and creating equivalent but easier or known sums (e.g., adding 6 + 7 by creating the known equivalent 6 + 6 + 1 = 12 + 1 = 13).
MAFS.1.OA.4.7:	Understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false. *For example, which of the following equations are true and which are false? 6 = 6, 7 = 8 – 1, 5 + 2 = 2 + 5, 4 + 1 = 5 + 2.*
MAFS.1.OA.4.8:	Determine the unknown whole number in an addition or subtraction equation relating to three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations 8 + ? = 11, 5 = [] – 3, 6 + 6 = [].*

MAFS.2.G.1.1:	Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces. Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.
MAFS.2.G.1.2:	Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.
MAFS.2.G.1.3:	Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words *halves, thirds, half of, a third of,* etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape.
MAFS.2.MD.1.1:	Measure the length of an object to the nearest inch, foot, centimeter, or meter by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.
MAFS.2.MD.1.2:	Describe the inverse relationship between the size of a unit and number of units needed to measure a given object. *Example: Suppose the perimeter of a room is lined with one-foot rulers. Now, suppose we want to line it with yardsticks instead of rulers. Will we need more or fewer yardsticks than rulers to do the job? Explain your answer.*
MAFS.2.MD.1.3:	Estimate lengths using units of inches, feet, yards, centimeters, and meters.
MAFS.2.MD.1.4:	Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.
MAFS.2.MD.2.5:	Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem.
MAFS.2.MD.2.6:	Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, ..., and represent whole-number sums and differences within 100 on a number line diagram.
MAFS.2.MD.3.7:	Tell and write time from analog and digital clocks to the nearest five minutes.
MAFS.2.MD.3.8:	Solve one- and two-step word problems involving dollar bills (singles, fives, tens, twenties, and hundreds) or coins (quarters, dimes, nickels, and pennies) using $ and ¢ symbols appropriately. Word problems may involve addition, subtraction, and equal groups situations[1]. *Example: The cash register shows that the total for your purchase is 59¢. You gave the cashier three quarters. How much change should you receive from the cashier?* a. Identify the value of coins and paper currency. b. Compute the value of any combination of coins within one dollar. c. Compute the value of any combinations of dollars (e.g., If you have three ten-dollar bills, one five-dollar bill, and two one-dollar bills, how much money do you have?). d. Relate the value of pennies, nickels, dimes, and quarters to other coins and to the dollar (e.g., There are five nickels in one quarter. There are two nickels in one dime. There are two and a half dimes in one quarter. There are twenty nickels in one dollar). ([1]See glossary Table 1)
MAFS.2.MD.4.9:	Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units.
MAFS.2.MD.4.10:	Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.
MAFS.2.NBT.1.1:	Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. Understand the following as special cases: a. 100 can be thought of as a bundle of ten tens — called a "hundred." b. The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).
MAFS.2.NBT.1.2:	Count within 1000; skip-count by 5s, 10s, and 100s.
MAFS.2.NBT.1.3:	Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.
MAFS.2.NBT.1.4:	Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.
MAFS.2.NBT.2.5:	Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.
MAFS.2.NBT.2.6:	Add up to four two-digit numbers using strategies based on place value and properties of operations.
MAFS.2.NBT.2.7:	Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.
MAFS.2.NBT.2.8:	Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900.
MAFS.2.NBT.2.9:	Explain why addition and subtraction strategies work, using place value and the properties of operations.
MAFS.2.OA.1.1:	Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.
MAFS.2.OA.1.a:	Determine the unknown whole number in an equation relating four or more whole numbers. For example, determine the unknown number that makes the equation true in the equations 37 + 10 + 10 = _____ + 18, ? – 6 = 13 – 4, and 15 – 9 = 6 + $\boxed{}$.
MAFS.2.OA.2.2:	Fluently add and subtract within 20 using mental strategies. By end of Grade 2, know from memory all sums of two one-digit numbers.
MAFS.2.OA.3.3:	Determine whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them by 2s; write an equation to express an even number as a sum of two equal addends.
MAFS.2.OA.3.4:	Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.
MAFS.K.CC.1.1:	Count to 100 by ones and by tens.
MAFS.K.CC.1.2:	Count forward beginning from a given number within the known sequence (instead of having to begin at 1).
MAFS.K.CC.1.3:	Read and write numerals from 0 to 20. Represent a number of objects with a written numeral 0–20 (with 0 representing a count of no objects).
MAFS.K.CC.2.4:	Understand the relationship between numbers and quantities; connect counting to cardinality. a. When counting objects, say the number names in the standard order, pairing each object with one and only one number name and each number name with one and only one object. b. Understand that the last number name said tells the number of objects counted. The number of objects is the same regardless of their arrangement or the order in which they were counted. c. Understand that each successive number name refers to a quantity that is one larger.

MAFS.K.CC.2.5:	Count to answer "how many?" questions about as many as 20 things arranged in a line, a rectangular array, or a circle, or as many as 10 things in a scattered configuration; given a number from 1–20, count out that many objects.
MAFS.K.CC.3.6:	Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group, e.g., by using matching and counting strategies.
MAFS.K.CC.3.7:	Compare two numbers between 1 and 10 presented as written numerals.
MAFS.K.G.1.1:	Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as *above, below, beside, in front of, behind, and next to.*
MAFS.K.G.1.2:	Correctly name shapes regardless of their orientations or overall size.
MAFS.K.G.1.3:	Identify shapes as two-dimensional (lying in a plane, "flat") or three-dimensional ("solid").
MAFS.K.G.2.4:	Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices/"corners") and other attributes (e.g., having sides of equal length).
MAFS.K.G.2.5:	Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.
MAFS.K.G.2.6:	Compose simple shapes to form larger shapes. *For example, "Can you join these two triangles with full sides touching to make a rectangle?"*
MAFS.K.MD.1.1:	Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.
MAFS.K.MD.1.2:	Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference. *For example, directly compare the heights of two children and describe one child as taller/shorter.*
MAFS.K.MD.1.a:	Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. *Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.*
MAFS.K.MD.2.3:	Classify objects into given categories; count the numbers of objects in each category and sort the categories by count.
MAFS.K.NBT.1.1:	Compose and decompose numbers from 11 to 19 into ten ones and some further ones, e.g., by using objects or drawings, and record each composition or decomposition by a drawing or equation (e.g., 18 = 10 + 8); understand that these numbers are composed of ten ones and one, two, three, four, five, six, seven, eight, or nine ones.
MAFS.K.OA.1.1:	Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations.
MAFS.K.OA.1.2:	Solve addition and subtraction word problems[1], and add and subtract within 10, e.g., by using objects or drawings to represent the problem ([1]Students are not required to independently read the word problems.)
MAFS.K.OA.1.4:	For any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects or drawings, and record the answer with a drawing or equation.
MAFS.K.OA.1.5:	Fluently add and subtract within 5.
MAFS.K.OA.1.a:	Use addition and subtraction within 10 to solve word problems involving both addends unknown, e.g., by using objects, drawings, and equations with symbols for the unknown numbers to represent the problem. (Students are not required to independently read the word problems.)
MAFS.K12.MP.1.1:	**Make sense of problems and persevere in solving them.** Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
MAFS.K12.MP.2.1:	**Reason abstractly and quantitatively**. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
MAFS.K12.MP.3.1:	**Construct viable arguments and critique the reasoning of others.** Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
MAFS.K12.MP.4.1:	**Model with mathematics.** Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

MAFS.K12.MP.5.1:	**Use appropriate tools strategically.** Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
MAFS.K12.MP.6.1:	**Attend to precision.** Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
MAFS.K12.MP.7.1:	**Look for and make use of structure.** Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
MAFS.K12.MP.8.1:	**Look for and express regularity in repeated reasoning.** Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

General Course Information and Notes

GENERAL NOTES

This course supports students who need additional instruction in foundational mathematics skills as it relates to core instruction. Instruction will use explicit, systematic, and sequential approaches to mathematics instruction addressing all domains including number sense, algebraic thinking, geometry, measurement and statistical thinking. Teachers will use the listed standards that correspond to each students' needs.

Effective instruction matches instruction to the need of the students in the group and provides multiple opportunities to practice the skill and receive feedback. The additional time allotted for this course is in addition to core instruction. The intervention includes materials and strategies designed to supplement core instruction.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Language Arts. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade-level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/la.pdf

GENERAL INFORMATION

Course Number: 5012005

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades PreK to 5 Education Courses > **Subject:** Mathematics > **SubSubject:** General Mathematics >

Abbreviated Title: FDN SKILLS MATH K-2

Course Length: Multiple (M) - Course length can vary

Course Attributes:

- Class Size Core Required

Course Level: 1

Course Status: Course Approved

Grade Level(s): K,1,2

Educator Certifications

Prekindergarten/Primary Education (Age 3 through Grade 3)
Elementary Education (Elementary Grades 1-6)
Elementary Education (Grades K-6)
Primary Education (K-3)
Early Childhood Education (Early Childhood)
Mathematics (Elementary Grades 1-6)

Foundational Skills in Mathematics K-2 (#5012005) 2022 - And Beyond

Course Standards

Name	Description
MA.1.AR.1.1:	Apply properties of addition to find a sum of three or more whole numbers. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is to apply the associative and commutative properties of addition. It is not the expectation to name the properties or use parentheses. Refer to Properties of Operations, Equality and Inequality (Appendix D). *Clarification 2:* Instruction includes emphasis on using the properties to make a ten when adding three or more numbers. *Clarification 3:* Addition is limited to sums within 20.
MA.1.AR.1.2:	Solve addition and subtraction real-world problems using objects, drawings or equations to represent the problem. **Clarifications:** *Clarification 1:* Instruction includes understanding the context of the problem, as well as the quantities within the problem. *Clarification 2:* Students are not expected to independently read word problems. *Clarification 3:* Addition and subtraction are limited to sums within 20 and related subtraction facts. Refer to Situations Involving Operations with Numbers (Appendix A).
MA.1.AR.2.1:	Restate a subtraction problem as a missing addend problem using the relationship between addition and subtraction. **Clarifications:** *Clarification 1:* Addition and subtraction are limited to sums within 20 and related subtraction facts.
MA.1.AR.2.2:	Determine and explain if equations involving addition or subtraction are true or false. **Clarifications:** *Clarification 1:* Instruction focuses on understanding of the equal sign. *Clarification 2:* Problem types are limited to an equation with no more than four terms. The sum or difference can be on either side of the equal sign. *Clarification 3:* Addition and subtraction are limited to sums within 20 and related subtraction facts.
MA.1.AR.2.3:	Determine the unknown whole number in an addition or subtraction equation, relating three whole numbers, with the unknown in any position. **Clarifications:** *Clarification 1:* Instruction begins the development of algebraic thinking skills where the symbolic representation of the unknown uses any symbol other than a letter. *Clarification 2:* Problems include the unknown on either side of the equal sign. *Clarification 3:* Addition and subtraction are limited to sums within 20 and related subtraction facts. Refer to Situations Involving Operations with Numbers (Appendix A).
MA.1.DP.1.1:	Collect data into categories and represent the results using tally marks or pictographs. **Clarifications:** *Clarification 1:* Instruction includes connecting tally marks to counting by 5s. *Clarification 2:* Data sets include geometric figures that are categorized using their defining attributes and data from the classroom or school. *Clarification 3:* Pictographs are limited to single-unit scales.
MA.1.DP.1.2:	Interpret data represented with tally marks or pictographs by calculating the total number of data points and comparing the totals of different categories. **Clarifications:** *Clarification 1:* Instruction focuses on the connection to addition and subtraction when calculating the total and comparing, respectively.
MA.1.FR.1.1:	Partition circles and rectangles into two and four equal-sized parts. Name the parts of the whole using appropriate language including halves or fourths. **Clarifications:** *Clarification 1:* This benchmark does not require writing the equal sized parts as a fraction with a numerator and denominator.
MA.1.GR.1.1:	Identify, compare and sort two- and three-dimensional figures based on their defining attributes. Figures are limited to circles, semi-circles, triangles, rectangles, squares, trapezoids, hexagons, spheres, cubes, rectangular prisms, cones and cylinders. **Clarifications:** *Clarification 1:* Instruction focuses on the defining attributes of a figure: whether it is closed or not; number of vertices, sides, edges or faces; and if it contains straight, curved or equal length sides or edges. *Clarification 2:* Instruction includes figures given in a variety of sizes, orientations and non-examples that lack one or more defining attributes. *Clarification 3:* Within this benchmark, the expectation is not to sort a combination of two- and three-dimensional figures at the same time or to define the attributes of trapezoids. *Clarification 4:* Instruction includes using formal and informal language to describe the defining attributes of figures when comparing and

	sorting.
MA.1.GR.1.2:	Sketch two-dimensional figures when given defining attributes. Figures are limited to triangles, rectangles, squares and hexagons.
MA.1.GR.1.3:	Compose and decompose two- and three-dimensional figures. Figures are limited to semi-circles, triangles, rectangles, squares, trapezoids, hexagons, cubes, rectangular prisms, cones and cylinders. **Clarifications:** *Clarification 1:* Instruction focuses on the understanding of spatial relationships relating to part-whole, and on the connection to breaking apart numbers and putting them back together. *Clarification 2:* Composite figures are composed without gaps or overlaps. *Clarification 3:* Within this benchmark, it is not the expectation to compose two- and three- dimensional figures at the same time.
MA.1.GR.1.4:	Given a real-world object, identify parts that are modeled by two- and three-dimensional figures. Figures are limited to semi-circles, triangles, rectangles, squares and hexagons, spheres, cubes, rectangular prisms, cones and cylinders.
MA.1.M.1.1:	Estimate the length of an object to the nearest inch. Measure the length of an object to the nearest inch or centimeter. **Clarifications:** *Clarification 1:* Instruction emphasizes measuring from the zero point of the ruler. The markings on the ruler indicate the unit of length by marking equal distances with no gaps or overlaps. *Clarification 2:* When estimating length, the expectation is to give a reasonable number of inches for the length of a given object.
MA.1.M.1.2:	Compare and order the length of up to three objects using direct and indirect comparison. **Clarifications:** *Clarification 1:* When directly comparing objects, the objects can be placed side by side or they can be separately measured in the same units and the measurements can be compared. *Clarification 2:* Two objects can be compared indirectly by directly comparing them to a third object.
MA.1.M.2.1:	Using analog and digital clocks, tell and write time in hours and half-hours. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is not to understand military time or to use a.m. or p.m. *Clarification 2:* Instruction includes the connection to partitioning circles into halves and to semi-circles.
MA.1.M.2.2:	Identify pennies, nickels, dimes and quarters, and express their values using the ¢ symbol. State how many of each coin equal a dollar. **Clarifications:** *Clarification 1:* Instruction includes the recognition of both sides of a coin. *Clarification 2:* Within this benchmark, the expectation is not to use decimal values.
MA.1.M.2.3:	Find the value of combinations of pennies, nickels and dimes up to one dollar, and the value of combinations of one, five and ten dollar bills up to $100. Use the ¢ and $ symbols appropriately. **Clarifications:** *Clarification 1:* Instruction includes the identification of a one, five and ten-dollar bill and the computation of the value of combinations of pennies, nickels and dimes or one, five and ten dollar bills. *Clarification 2:* Instruction focuses on the connection to place value and skip counting. *Clarification 3:* Within this benchmark, the expectation is not to use decimal values or to find the value of a combination of coins and dollars.
MA.1.NSO.1.1:	Starting at a given number, count forward and backwards within 120 by ones. Skip count by 2s to 20 and by 5s to 100. **Clarifications:** *Clarification 1:* Instruction focuses on the connection to addition as “counting on” and subtraction as “counting back”. *Clarification 2:*Instruction also focuses on the recognition of patterns within skip counting which helps build a foundation for multiplication in later grades. *Clarification 3:* Instruction includes recognizing counting sequences using visual charts, such as a 120 chart, to emphasize base 10 place value.
MA.1.NSO.1.2:	Read numbers from 0 to 100 written in standard form, expanded form and word form. Write numbers from 0 to 100 using standard form and expanded form.
MA.1.NSO.1.3:	Compose and decompose two-digit numbers in multiple ways using tens and ones. Demonstrate each composition or decomposition with objects, drawings and expressions or equations.
MA.1.NSO.1.4:	Plot, order and compare whole numbers up to 100. **Clarifications:** *Clarification 1:* When comparing numbers, instruction includes using a number line and using place values of the tens and ones digits. *Clarification 2:* Within this benchmark, the expectation is to use terms (e.g., less than, greater than, between or equal to) and symbols (<, > or =).
MA.1.NSO.2.1:	Recall addition facts with sums to 10 and related subtraction facts with automaticity.
MA.1.NSO.2.2:	Add two whole numbers with sums from 0 to 20, and subtract using related facts with procedural reliability. **Clarifications:** *Clarification 1:* Instruction focuses on helping a student choose a method they can use reliably. *Clarification 2:* Instruction includes situations involving adding to, putting together, comparing and taking from.
MA.1.NSO.2.3:	Identify the number that is one more, one less, ten more and ten less than a given two-digit number.
MA.1.NSO.2.4:	Explore the addition of a two-digit number and a one-digit number with sums to 100. **Clarifications:** *Clarification 1:* Instruction focuses on combining ones and tens and composing new tens from ones, when needed. *Clarification 2:* Instruction includes the use of manipulatives, number lines, drawings or models.
	Explore subtraction of a one-digit number from a two-digit number.

MA.1.NSO.2.5:	**Clarifications:** *Clarification 1:* Instruction focuses on utilizing the number line as a tool for subtraction through “counting on” or “counting back”. The process of counting on highlights subtraction as a missing addend problem. *Clarification 2:* Instruction includes the use of manipulatives, drawings or equations to decompose tens and regroup ones, when needed.
MA.2.AR.1.1:	Solve one- and two-step addition and subtraction real-world problems. **Clarifications:** *Clarification 1:* Instruction includes understanding the context of the problem, as well as the quantities within the problem. *Clarification 2:* Problems include creating real-world situations based on an equation. *Clarification 3:* Addition and subtraction are limited to sums up to 100 and related differences. Refer to Situations Involving Operations with Numbers (Appendix A).
MA.2.AR.2.1:	Determine and explain whether equations involving addition and subtraction are true or false. **Clarifications:** *Clarification 1:* Instruction focuses on understanding of the equal sign. *Clarification 2:* Problem types are limited to an equation with three or four terms. The sum or difference can be on either side of the equal sign. *Clarification 3:* Addition and subtraction are limited to sums up to 100 and related differences.
MA.2.AR.2.2:	Determine the unknown whole number in an addition or subtraction equation, relating three or four whole numbers, with the unknown in any position. **Clarifications:** *Clarification 1:* Instruction extends the development of algebraic thinking skills where the symbolic representation of the unknown uses any symbol other than a letter. *Clarification 2:* Problems include having the unknown on either side of the equal sign. *Clarification 3:* Addition and subtraction are limited to sums up to 100 and related differences. Refer to Situations Involving Operations with Numbers (Appendix A).
MA.2.AR.3.1:	Represent an even number using two equal groups or two equal addends. Represent an odd number using two equal groups with one left over or two equal addends plus 1. **Clarifications:** *Clarification 1:* Instruction focuses on the connection of recognizing even and odd numbers using skip counting, arrays and patterns in the ones place. *Clarification 2:* Addends are limited to whole numbers less than or equal to 12.
MA.2.AR.3.2:	Use repeated addition to find the total number of objects in a collection of equal groups. Represent the total number of objects using rectangular arrays and equations. **Clarifications:** *Clarification 1:* Instruction includes making a connection between arrays and repeated addition, which builds a foundation for multiplication. *Clarification 2:* The total number of objects is limited to 25.
MA.2.DP.1.1:	Collect, categorize and represent data using tally marks, tables, pictographs or bar graphs. Use appropriate titles, labels and units. **Clarifications:** *Clarification 1:* Data displays can be represented both horizontally and vertically. Scales on graphs are limited to ones, fives or tens.
MA.2.DP.1.2:	Interpret data represented with tally marks, tables, pictographs or bar graphs including solving addition and subtraction problems. **Clarifications:** *Clarification 1:* Addition and subtraction problems are limited to whole numbers with sums within 100 and related differences. *Clarification 2:* Data displays can be represented both horizontally and vertically. Scales on graphs are limited to ones, fives or tens.
MA.2.FR.1.1:	Partition circles and rectangles into two, three or four equal-sized parts. Name the parts using appropriate language, and describe the whole as two halves, three thirds or four fourths. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is not to write the equal-sized parts as a fraction with a numerator and denominator. *Clarification 2:* Problems include mathematical and real-world context.
MA.2.FR.1.2:	Partition rectangles into two, three or four equal-sized parts in two different ways showing that equal-sized parts of the same whole may have different shapes.
MA.2.GR.1.1:	Identify and draw two-dimensional figures based on their defining attributes. Figures are limited to triangles, rectangles, squares, pentagons, hexagons and octagons. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation includes the use of rulers and straight edges.
MA.2.GR.1.2:	Categorize two-dimensional figures based on the number and length of sides, number of vertices, whether they are closed or not and whether the edges are curved or straight. **Clarifications:** *Clarification 1:* Instruction focuses on using formal and informal language to describe defining attributes when categorizing.
MA.2.GR.1.3:	Identify line(s) of symmetry for a two-dimensional figure. **Clarifications:** *Clarification 1:* Instruction focuses on the connection between partitioning two-dimensional figures and symmetry. *Clarification 2:* Problem types include being given an image and determining whether a given line is a line of symmetry or not.
	Explore perimeter as an attribute of a figure by placing unit segments along the boundary without gaps or overlaps. Find perimeters of rectangles by counting unit segments.

MA.2.GR.2.1:	**Clarifications:** *Clarification 1:* Instruction emphasizes the conceptual understanding that perimeter is an attribute that can be measured for a two-dimensional figure. *Clarification 2:* Instruction includes real-world objects, such as picture frames or desktops.
MA.2.GR.2.2:	Find the perimeter of a polygon with whole-number side lengths. Polygons are limited to triangles, rectangles, squares and pentagons. **Clarifications:** *Clarification 1:* Instruction includes the connection to the associative and commutative properties of addition. Refer to Properties of Operations, Equality and Inequality (Appendix D). *Clarification 2:* Within this benchmark, the expectation is not to use a formula to find perimeter. *Clarification 3:* Instruction includes cases where the side lengths are given or measured to the nearest unit. *Clarification 4:* Perimeter cannot exceed 100 units and responses include the appropriate units.
MA.2.M.1.1:	Estimate and measure the length of an object to the nearest inch, foot, yard, centimeter or meter by selecting and using an appropriate tool. **Clarifications:** *Clarification 1:* Instruction includes seeing rulers and tape measures as number lines. *Clarification 2:* Instruction focuses on recognizing that when an object is measured in two different units, fewer of the larger units are required. When comparing measurements of the same object in different units, measurement conversions are not expected. *Clarification 3:* When estimating the size of an object, a comparison with an object of known size can be used.
MA.2.M.1.2:	Measure the lengths of two objects using the same unit and determine the difference between their measurements. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is to measure objects to the nearest inch, foot, yard, centimeter or meter.
MA.2.M.1.3:	Solve one- and two-step real-world measurement problems involving addition and subtraction of lengths given in the same units. **Clarifications:** *Clarification 1:* Addition and subtraction problems are limited to sums within 100 and related differences.
MA.2.M.2.1:	Using analog and digital clocks, tell and write time to the nearest five minutes using a.m. and p.m. appropriately. Express portions of an hour using the fractional terms half an hour, half past, quarter of an hour, quarter after and quarter til. **Clarifications:** *Clarification 1:* Instruction includes the connection to partitioning of circles and to the number line. *Clarification 2:* Within this benchmark, the expectation is not to understand military time.
MA.2.M.2.2:	Solve one- and two-step addition and subtraction real-world problems involving either dollar bills within \$100 or coins within 100¢ using \$ and ¢ symbols appropriately. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is not to use decimal values. *Clarification 2:* Addition and subtraction problems are limited to sums within 100 and related differences. Refer to Situations Involving Operations with Numbers (Appendix A).
MA.2.NSO.1.1:	Read and write numbers from 0 to 1,000 using standard form, expanded form and word form.
MA.2.NSO.1.2:	Compose and decompose three-digit numbers in multiple ways using hundreds, tens and ones. Demonstrate each composition or decomposition with objects, drawings and expressions or equations.
MA.2.NSO.1.3:	Plot, order and compare whole numbers up to 1,000. **Clarifications:** *Clarification 1:* When comparing numbers, instruction includes using a number line and using place values of the hundreds, tens and ones digits. *Clarification 2:* Within this benchmark, the expectation is to use terms (e.g., less than, greater than, between or equal to) and symbols (<, > or =).
MA.2.NSO.1.4:	Round whole numbers from 0 to 100 to the nearest 10. **Clarifications:** *Clarification 1:* Within the benchmark, the expectation is to understand that rounding is a process that produces a number with a similar value that is less precise but easier to use.
MA.2.NSO.2.1:	Recall addition facts with sums to 20 and related subtraction facts with automaticity.
MA.2.NSO.2.2:	Identify the number that is ten more, ten less, one hundred more and one hundred less than a given three-digit number.
MA.2.NSO.2.3:	Add two whole numbers with sums up to 100 with procedural reliability. Subtract a whole number from a whole number, each no larger than 100, with procedural reliability. **Clarifications:** *Clarification 1:* Instruction focuses on helping a student choose a method they can use reliably.
MA.2.NSO.2.4:	Explore the addition of two whole numbers with sums up to 1,000. Explore the subtraction of a whole number from a whole number, each no larger than 1,000. **Clarifications:** *Clarification 1:* Instruction includes the use of manipulatives, number lines, drawings or properties of operations or place value. *Clarification 2:* Instruction focuses on composing and decomposing ones, tens and hundreds when needed.
MA.K.AR.1.1:	For any number from 1 to 9, find the number that makes 10 when added to the given number. **Clarifications:** *Clarification 1:* Instruction includes creating a ten using manipulatives, number lines, models and drawings.
MA.K.AR.1.2:	Given a number from 0 to 10, find the different ways it can be represented as the sum of two numbers. **Clarifications:** *Clarification 1:* Instruction includes the exploration of finding possible pairs to make a sum using manipulatives, objects, drawings and

	expressions; and understanding how the different representations are related to each other.
MA.K.AR.1.3:	Solve addition and subtraction real-world problems using objects, drawings or equations to represent the problem. **Clarifications:** *Clarification 1:* Instruction includes understanding the context of the problem, as well as the quantities within the problem. *Clarification 2:* Students are not expected to independently read word problems. *Clarification 3:* Addition and subtraction are limited to sums within 10 and related subtraction facts. Refer to Situations Involving Operations with Numbers (Appendix A).
MA.K.AR.2.1:	Explain why addition or subtraction equations are true using objects or drawings. **Clarifications:** *Clarification 1:* Instruction focuses on the understanding of the equal sign. *Clarification 2:* Problem types are limited to an equation with two or three terms. The sum or difference can be on either side of the equal sign. *Clarification 3:* Addition and subtraction are limited to sums within 20 and related subtraction facts.
MA.K.DP.1.1:	Collect and sort objects into categories and compare the categories by counting the objects in each category. Report the results verbally, with a written numeral or with drawings. **Clarifications:** *Clarification 1:* Instruction focuses on supporting work in counting. *Clarification 2:* Instruction includes geometric figures that can be categorized using their defining attributes. *Clarification 3:* Within this benchmark, it is not the expectation for students to construct formal representations or graphs on their own.
MA.K.GR.1.1:	Identify two- and three-dimensional figures regardless of their size or orientation. Figures are limited to circles, triangles, rectangles, squares, spheres, cubes, cones and cylinders. **Clarifications:** *Clarification 1:* Instruction includes a wide variety of circles, triangles, rectangles, squares, spheres, cubes, cones and cylinders. *Clarification 2:* Instruction includes a variety of non-examples that lack one or more defining attributes. *Clarification 3:* Two-dimensional figures can be either filled, outlined or both.
MA.K.GR.1.2:	Compare two-dimensional figures based on their similarities, differences and positions. Sort two-dimensional figures based on their similarities and differences. Figures are limited to circles, triangles, rectangles and squares. **Clarifications:** *Clarification 1:* Instruction includes exploring figures in a variety of sizes and orientations. *Clarification 2:* Instruction focuses on using informal language to describe relative positions and the similarities or differences between figures when comparing and sorting.
MA.K.GR.1.3:	Compare three-dimensional figures based on their similarities, differences and positions. Sort three-dimensional figures based on their similarities and differences. Figures are limited to spheres, cubes, cones and cylinders. **Clarifications:** *Clarification 1:* Instruction includes exploring figures in a variety of sizes and orientations. *Clarification 2:* Instruction focuses on using informal language to describe relative positions and the similarities or differences between figures when comparing and sorting.
MA.K.GR.1.4:	Find real-world objects that can be modeled by a given two- or three-dimensional figure. Figures are limited to circles, triangles, rectangles, squares, spheres, cubes, cones and cylinders.
MA.K.GR.1.5:	Combine two-dimensional figures to form a given composite figure. Figures used to form a composite shape are limited to triangles, rectangles and squares. **Clarifications:** *Clarification 1:* This benchmark is intended to develop the understanding of spatial relationships.
MA.K.M.1.1:	Identify the attributes of a single object that can be measured such as length, volume or weight. **Clarifications:** *Clarification 1:* Within this benchmark, measuring is not required.
MA.K.M.1.2:	Directly compare two objects that have an attribute which can be measured in common. Express the comparison using language to describe the difference. **Clarifications:** *Clarification 1:* To directly compare length, objects are placed next to each other with one end of each object lined up to determine which one is longer. *Clarification 2:* Language to compare length includes short, shorter, long, longer, tall, taller, high or higher. Language to compare volume includes has more, has less, holds more, holds less, more full, less full, full, empty, takes up more space or takes up less space. Language to compare weight includes heavy, heavier, light, lighter, weighs more or weighs less.
MA.K.M.1.3:	Express the length of an object, up to 20 units long, as a whole number of lengths by laying non-standard objects end to end with no gaps or overlaps. **Clarifications:** *Clarification 1:* Non-standard units of measurement are units that are not typically used, such as paper clips or colored tiles. To measure with non-standard units, students lay multiple copies of the same object end to end with no gaps or overlaps. The length is shown by the number of objects needed.
MA.K.NSO.1.1:	Given a group of up to 20 objects, count the number of objects in that group and represent the number of objects with a written numeral. State the number of objects in a rearrangement of that group without recounting. **Clarifications:** *Clarification 1:* Instruction focuses on developing an understanding of cardinality and one-to-one correspondence. *Clarification 2:* Instruction includes counting objects and pictures presented in a line, rectangular array, circle or scattered arrangement. Objects presented in a scattered arrangement are limited to 10.

	Clarification 3: Within this benchmark, the expectation is not to write the number in word form.
MA.K.NSO.1.2:	Given a number from 0 to 20, count out that many objects. **Clarifications:** *Clarification 1:* Instruction includes giving a number verbally or with a written numeral.
MA.K.NSO.1.3:	Identify positions of objects within a sequence using the words "first," "second," "third," "fourth" or "fifth." **Clarifications:** *Clarification 1:* Instruction includes the understanding that rearranging a group of objects does not change the total number of objects but may change the order of an object in that group.
MA.K.NSO.1.4:	Compare the number of objects from 0 to 20 in two groups using the terms less than, equal to or greater than. **Clarifications:** *Clarification 1:* Instruction focuses on matching, counting and the connection to addition and subtraction. *Clarification 2:* Within this benchmark, the expectation is not to use the relational symbols =,> or <.
MA.K.NSO.2.1:	Recite the number names to 100 by ones and by tens. Starting at a given number, count forward within 100 and backward within 20. **Clarifications:** *Clarification 1:* When counting forward by ones, students are to say the number names in the standard order and understand that each successive number refers to a quantity that is one larger. When counting backward, students are to understand that each succeeding number in the count sequence refers to a quantity that is one less. *Clarification 2:* Within this benchmark, the expectation is to recognize and count to 100 by the end of Kindergarten.
MA.K.NSO.2.2:	Represent whole numbers from 10 to 20, using a unit of ten and a group of ones, with objects, drawings and expressions or equations.
MA.K.NSO.2.3:	Locate, order and compare numbers from 0 to 20 using the number line and terms less than, equal to or greater than. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is not to use the relational symbols =,> or <. *Clarification 2:* When comparing numbers from 0 to 20, both numbers are plotted on the same number line. *Clarification 3:* When locating numbers on the number line, the expectation includes filling in a missing number by counting from left to right on the number line.
MA.K.NSO.3.1:	Explore addition of two whole numbers from 0 to 10, and related subtraction facts. **Clarifications:** *Clarification 1:* Instruction includes objects, fingers, drawings, number lines and equations. *Clarification 2:* Instruction focuses on the connection that addition is "putting together" or "counting on" and that subtraction is "taking apart" or "taking from." Refer to Situations Involving Operations with Numbers (Appendix A). *Clarification 3:* Within this benchmark, it is the expectation that one problem can be represented in multiple ways and understanding how the different representations are related to each other.
MA.K.NSO.3.2:	Add two one-digit whole numbers with sums from 0 to 10 and subtract using related facts with procedural reliability. **Clarifications:** *Clarification 1:* Instruction focuses on helping a student choose a method they can use reliably.
MA.K12.MTR.1.1:	Mathematicians who participate in effortful learning both individually and with others: • Analyze the problem in a way that makes sense given the task. • Ask questions that will help with solving the task. • Build perseverance by modifying methods as needed while solving a challenging task. • Stay engaged and maintain a positive mindset when working to solve tasks. • Help and support each other when attempting a new method or approach. **Clarifications:** Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: • Build understanding through modeling and using manipulatives. • Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. • Progress from modeling problems with objects and drawings to using algorithms and equations. • Express connections between concepts and representations. • Choose a representation based on the given context or purpose. **Clarifications:** Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.
	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context.

MA.K12.MTR.3.1:	• Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations. **Clarifications:** Teachers who encourage students to complete tasks with mathematical fluency: • Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. • Offer multiple opportunities for students to practice efficient and generalizable methods. • Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: • Communicate mathematical ideas, vocabulary and methods effectively. • Analyze the mathematical thinking of others. • Compare the efficiency of a method to those expressed by others. • Recognize errors and suggest how to correctly solve the task. • Justify results by explaining methods and processes. • Construct possible arguments based on evidence. **Clarifications:** Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. **Clarifications:** Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. **Clarifications:** Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems. • Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. **Clarifications:** Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning. **Clarifications:** K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing.

ELA.K12.EE.1.1:	2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. **Clarifications:** See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. **Clarifications:** Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. **Clarifications:** In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think _______ because ______." The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. **Clarifications:** Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. **Clarifications:** In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

General Course Information and Notes

VERSION DESCRIPTION

This course supports students who need additional instruction in foundational mathematics skills as it relates to core instruction. Instruction will use explicit, systematic, and sequential approaches to mathematics instruction addressing all strands including number sense & operations, fractions, algebraic reasoning, geometric reasoning, measurement and data analysis & probability. Teachers will use the listed benchmarks that correspond to each students' needs.

Effective instruction matches instruction to the need of the students in the group and provides multiple opportunities to practice the skill and receive feedback. The additional time allotted for this course is in addition to core instruction. The intervention includes materials and strategies designed to supplement core instruction.

GENERAL NOTES

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards
This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:
https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Number: 5012005

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades PreK to 5 Education Courses > **Subject:** Mathematics > **SubSubject:** General Mathematics >

Abbreviated Title: FDN SKILLS MATH K-2

Course Length: Multiple (M) - Course length can vary

Course Attributes:

- Class Size Core Required

Course Type: Elective Course

Course Level: 1

Course Status: State Board Approved

Grade Level(s): K,1,2

Educator Certifications

Elementary Education (Elementary Grades 1-6)
Elementary Education (Grades K-6)
Primary Education (K-3)
Prekindergarten/Primary Education (Age 3 through Grade 3)
Early Childhood Education (Early Childhood)
Mathematics (Elementary Grades 1-6)

Foundational Skills in Mathematics 3-5 (#5012015) 2019 - 2022 (current)

Course Standards

Name	Description
MAFS.3.G.1.1:	Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.
MAFS.3.G.1.2:	Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. *For example, partition a shape into 4 parts with equal area, and describe the area of each part as 1/4 of the area of the shape.*
MAFS.3.MD.1.1:	Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.
MAFS.3.MD.1.2:	Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units. **Clarifications:** **Examples of Opportunities for In-Depth Focus** Continuous measurement quantities such as liquid volume, mass, and so on are an important context for fraction arithmetic (cf. 4.NF.2.4c, 5.NF.2.7c, 5.NF.2.3). In grade 3, students begin to get a feel for continuous measurement quantities and solve whole- number problems involving such quantities.
MAFS.3.MD.2.3:	Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs. *For example, draw a bar graph in which each square in the bar graph might represent 5 pets.*
MAFS.3.MD.2.4:	Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters.
MAFS.3.MD.3.5:	Recognize area as an attribute of plane figures and understand concepts of area measurement. a. A square with side length 1 unit, called “a unit square,” is said to have “one square unit” of area, and can be used to measure area. b. A plane figure which can be covered without gaps or overlaps by *n* unit squares is said to have an area of *n* square units.
MAFS.3.MD.3.6:	Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).
MAFS.3.MD.3.7:	Relate area to the operations of multiplication and addition. a. Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths. b. Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning. c. Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and b + c is the sum of a × b and a × c. Use area models to represent the distributive property in mathematical reasoning. d. Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems. **Clarifications:** **Examples of Opportunities for In-Depth Focus** Area is a major concept within measurement, and area models must function as a support for multiplicative reasoning in grade 3 and beyond.
MAFS.3.MD.4.8:	Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.
MAFS.3.NBT.1.1:	Use place value understanding to round whole numbers to the nearest 10 or 100.
MAFS.3.NBT.1.2:	Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. **Clarifications:** Students fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. (Although 3.OA.3.7 and 3.NBT.1.2 are both fluency standards, these two standards do not represent equal investments of time in grade 3. Note that students in grade 2 were already adding and subtracting within 1000, just not fluently. That makes 3.NBT.1.2 a relatively small and incremental expectation. By contrast, multiplication and division are new in grade 3, and meeting the multiplication and division fluency standard 3.OA.3.7 with understanding is a major portion of students' work in grade 3.)
MAFS.3.NBT.1.3:	Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9 × 80, 5 × 60) using strategies based on place value and properties of operations.
MAFS.3.NF.1.1:	Understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b.
	Understand a fraction as a number on the number line; represent fractions on a number line diagram. a. Represent a fraction 1/b on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into *b* equal parts.

	Recognize that each part has size 1/b and that the endpoint of the part based at 0 locates the number 1/b on the number line. b. Represent a fraction *a/b* on a number line diagram by marking off *a* lengths *1/b* from 0. Recognize that the resulting interval has size *a/b* and that its endpoint locates the number *a/b* on the number line.
MAFS.3.NF.1.2:	**Clarifications:** **Example of Opportunities for In-Depth Focus** Developing an understanding of fractions as numbers is essential for future work with the number system. It is critical that students at this grade are able to place fractions on a number line diagram and understand them as a related component of their ever- expanding number system. **Fluency Expectations or Examples of Culminating Standards** Students fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. 3.NBT.1.2 a relatively small and incremental expectation.
MAFS.3.NF.1.3:	Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. a. Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line. b. Recognize and generate simple equivalent fractions, e.g., 1/2 = 2/4, 4/6 = 2/3). Explain why the fractions are equivalent, e.g., by using a visual fraction model. c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. *Examples: Express 3 in the form 3 = 3/1; recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram.* d. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.
MAFS.3.OA.1.1:	Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. *For example, describe a context in which a total number of objects can be expressed as 5 × 7.* **Clarifications:** **Examples of Opportunities for In-Depth Focus** Word problems involving equal groups, arrays, and measurement quantities can be used to build students' understanding of and skill with multiplication and division, as well as to allow students to demonstrate their understanding of and skill with these operations.
MAFS.3.OA.1.2:	Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. *For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.* **Clarifications:** **Examples of Opportunities for In-Depth Focus** Word problems involving equal groups, arrays, and measurement quantities can be used to build students' understanding of and skill with multiplication and division, as well as to allow students to demonstrate their understanding of and skill with these operations.
MAFS.3.OA.1.3:	Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. **Clarifications:** **Examples of Opportunities for In-Depth Focus** Word problems involving equal groups, arrays, and measurement quantities can be used to build students' understanding of and skill with multiplication and division, as well as to allow students to demonstrate their understanding of and skill with these operations.
MAFS.3.OA.1.4:	Determine the unknown whole number in a multiplication or division equation relating three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations* 8 × ? = 48, 5 = [] ÷ 3, 6 × 6 = ?. **Clarifications:** **Examples of Opportunities for In-Depth Focus** Word problems involving equal groups, arrays, and measurement quantities can be used to build students' understanding of and skill with multiplication and division, as well as to allow students to demonstrate their understanding of and skill with these operations.
MAFS.3.OA.2.5:	Apply properties of operations as strategies to multiply and divide. *Examples: If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication.) 3 × 5 × 2 can be found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. (Associative property of multiplication.) Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. (Distributive property.)*
MAFS.3.OA.2.6:	Understand division as an unknown-factor problem. *For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8.*
MAFS.3.OA.3.7:	Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers. **Clarifications:** **Fluency Expectations or Examples of Culminating Standards** Students fluently multiply and divide within 100. By the end of grade 3, they know all products of two one-digit numbers from memory. Multiplication and division are new in grade 3, and meeting the multiplication and division fluency standard 3.OA.3.7 with understanding is a major portion of students' work in grade 3. **Examples of Opportunities for In-Depth Focus** Finding single-digit products and related quotients is a required fluency for grade 3. Reaching fluency will take much of the year for many students. These skills and the understandings that support them are crucial; students will rely on them for years to come as they learn to multiply and divide with multidigit whole numbers and to add, subtract, multiply, and divide with fractions. After multiplication and division situations have been established, reasoning about patterns in products (e.g., products involving factors of 5 or 9) can help students remember particular

	products and quotients. Practice — and if necessary, extra support — should continue all year for those who need it to attain fluency.
MAFS.3.OA.4.8:	Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.
MAFS.3.OA.4.9:	Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. *For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.*
MAFS.4.G.1.1:	Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.
MAFS.4.G.1.2:	Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.
MAFS.4.G.1.3:	Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.
MAFS.4.MD.1.1:	Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. *For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...*
MAFS.4.MD.1.2:	Use the four operations to solve word problems[1] involving distances, intervals of time, and money, including problems involving simple fractions or decimals[2]. Represent fractional quantities of distance and intervals of time using linear models. ([1]See glossary Table 1 and Table 2) ([2]Computational fluency with fractions and decimals is not the goal for students at this grade level.)
MAFS.4.MD.1.3:	Apply the area and perimeter formulas for rectangles in real world and mathematical problems. *For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.*
MAFS.4.MD.2.4:	Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. *For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.*
MAFS.4.MD.3.5:	Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement: a. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a “one-degree angle,” and can be used to measure angles. b. An angle that turns through *n* one-degree angles is said to have an angle measure of *n* degrees.
MAFS.4.MD.3.6:	Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.
MAFS.4.MD.3.7:	Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.
MAFS.4.NBT.1.1:	Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. *For example, recognize that 700 ÷ 70 = 10 by applying concepts of place value and division.*
MAFS.4.NBT.1.2:	Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.
MAFS.4.NBT.1.3:	Use place value understanding to round multi-digit whole numbers to any place.
MAFS.4.NBT.2.4:	Fluently add and subtract multi-digit whole numbers using the standard algorithm. **Clarifications:** **Fluency Expectations or Examples of Culminating Standards** Students’ work with decimals (4.NF.3.5–3.7) depends to some extent on concepts of fraction
MAFS.4.NBT.2.5:	Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. **Clarifications:** **Examples of Opportunities for In-Depth Focus** When students work toward meeting this standard, they combine prior understanding of multiplication with deepening understanding of the base-ten system of units to express the product of two multi-digit numbers as another multi-digit number. This work will continue in grade 5 and culminate in fluency with the standard algorithms in grade 6.
MAFS.4.NBT.2.6:	Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. **Clarifications:** **Examples of Opportunities for In-Depth Focus** When students work toward meeting this standard, they combine prior understanding of multiplication and division with deepening understanding of the base-ten system of units to find whole-number quotients and remainders with up to four-digit dividends and one- digit divisors. This work will develop further in grade 5 and culminate in fluency with the standard algorithms in grade 6.
MAFS.4.NF.1.1:	Explain why a fraction a/b is equivalent to a fraction (n × a)/(n × b) by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions. **Clarifications:** **Examples of Opportunities for In-Depth Focus** Extending fraction equivalence to the general case is necessary to extend arithmetic from whole numbers to fractions and decimals.
MAFS.4.NF.1.2:	Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.
	Understand a fraction a/b with a > 1 as a sum of fractions 1/b.

MAFS.4.NF.2.3:	a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. b. Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. *Examples: 3/8 = 1/8 + 1/8 + 1/8 ; 3/8 = 1/8 + 2/8 ; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8.* c. Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction. d. Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem. **Clarifications:** **Examples of Opportunities for In-Depth Focus** This standard represents an important step in the multi-grade progression for addition and subtraction of fractions. Students extend their prior understanding of addition and subtraction to add and subtract fractions with like denominators by thinking of adding or subtracting so many unit fractions.
MAFS.4.NF.2.4:	Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. a. Understand a fraction a/b as a multiple of 1/b. *For example, use a visual fraction model to represent 5/4 as the product 5 × (1/4), recording the conclusion by the equation 5/4 = 5 × (1/4).* b. Understand a multiple of a/b as a multiple of 1/b, and use this understanding to multiply a fraction by a whole number. *For example, use a visual fraction model to express 3 × (2/5) as 6 × (1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.)* c. Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. *For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?* **Clarifications:** **Examples of Opportunities for In-Depth Focus** This standard represents an important step in the multi-grade progression for multiplication and division of fractions. Students extend their developing understanding of multiplication to multiply a fraction by a whole number.
MAFS.4.NF.3.5:	Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. *For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100.*
MAFS.4.NF.3.6:	Use decimal notation for fractions with denominators 10 or 100. *For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram.*
MAFS.4.NF.3.7:	Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model.
MAFS.4.OA.1.1:	Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.
MAFS.4.OA.1.2:	Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.
MAFS.4.OA.1.3:	Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.
MAFS.4.OA.1.a:	Determine whether an equation is true or false by using comparative relational thinking. *For example, without adding 60 and 24, determine whether the equation 60 + 24 = 57 + 27 is true or false.*
MAFS.4.OA.1.b:	Determine the unknown whole number in an equation relating four whole numbers using comparative relational thinking. *For example, solve 76 + 9 = n + 5 for n by arguing that nine is four more than five, so the unknown number must be four greater than 76.*
MAFS.4.OA.2.4:	Investigate factors and multiples. a. Find all factor pairs for a whole number in the range 1–100. b. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. c. Determine whether a given whole number in the range 1–100 is prime or composite.
MAFS.4.OA.3.5:	Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. *For example, given the rule “Add 3” and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.*
MAFS.5.G.1.1:	Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).
MAFS.5.G.1.2:	Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.
MAFS.5.G.2.3:	Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. *For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.*
MAFS.5.G.2.4:	Classify and organize two-dimensional figures into Venn diagrams based on the attributes of the figures.
MAFS.5.MD.1.1:	Convert among different-sized standard measurement units (i.e., km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec) within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.
MAFS.5.MD.2.2:	Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.*

MAFS.5.MD.3.3:	Recognize volume as an attribute of solid figures and understand concepts of volume measurement. a. A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume. b. A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units.
MAFS.5.MD.3.4:	Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.
MAFS.5.MD.3.5:	Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume. a. Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication. b. Apply the formulas V = l × w × h and V = B × h for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems. c. Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems. **Clarifications:** **Examples of Opportunities for In-Depth Focus** Students work with volume as an attribute of a solid figure and as a measurement quantity. Students also relate volume to multiplication and addition. This work begins a progression leading to valuable skills in geometric measurement in middle school.
MAFS.5.NBT.1.1:	Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left. **Clarifications:** **Examples of Opportunities for In-Depth Focus** The extension of the place value system from whole numbers to decimals is a major intellectual accomplishment involving understanding and skill with base-ten units and fractions.
MAFS.5.NBT.1.2:	Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.
MAFS.5.NBT.1.3:	Read, write, and compare decimals to thousandths. a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., 347.392 = 3 × 100 + 4 × 10 + 7 × 1 + 3 × (1/10) + 9 × (1/100) + 2 × (1/1000). b. Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.
MAFS.5.NBT.1.4:	Use place value understanding to round decimals to any place.
MAFS.5.NBT.2.5:	Fluently multiply multi-digit whole numbers using the standard algorithm. **Clarifications:** **Fluency Expectations or Examples of Culminating Standards** 5.NBT.2.5 Students fluently multiply multi-digit whole numbers using the standard algorithm.
MAFS.5.NBT.2.6:	Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. **Clarifications:** **Examples of Opportunities for In-Depth Focus** The extension from one-digit divisors to two-digit divisors requires care. This is a major milestone along the way to reaching fluency with the standard algorithm in grade 6 (6.NS.2).
MAFS.5.NBT.2.7:	Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.
MAFS.5.NF.1.1:	Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. *For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (ad + bc)/bd.)*
MAFS.5.NF.1.2:	Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. *For example, recognize an incorrect result 2/5 + 1/2 = 3/7, by observing that 3/7 < 1/2.* **Clarifications:** **Examples of Opportunities for In-Depth Focus** When students meet this standard, they bring together the threads of fraction equivalence (grades 3–5) and addition and subtraction (grades K–4) to fully extend addition and subtraction to fractions.
MAFS.5.NF.2.3:	Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. *For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?*
	Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.

MAFS.5.NF.2.4:	a. Interpret the product $(a/b) \times q$ as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$. *For example, use a visual fraction model to show (2/3) × 4 = 8/3, and create a story context for this equation. Do the same with (2/3) × (4/5) = 8/15. (In general, (a/b) × (c/d) = ac/bd.)* b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas. **Clarifications:** **Examples of Opportunities for In-Depth Focus** When students meet this standard, they fully extend multiplication to fractions, making division of fractions in grade 6 (6.NS.1) a near target.
MAFS.5.NF.2.5:	Interpret multiplication as scaling (resizing), by: a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication. b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1.
MAFS.5.NF.2.6:	Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.
MAFS.5.NF.2.7:	Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. *For example, create a story context for (1/3) ÷ 4, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that (1/3) ÷ 4 = 1/12 because (1/12) × 4 = 1/3.* b. Interpret division of a whole number by a unit fraction, and compute such quotients. *For example, create a story context for 4 ÷ (1/5), and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that 4 ÷ (1/5) = 20 because 20 × (1/5) = 4.* c. Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, how much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?*
MAFS.5.OA.1.1:	Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.
MAFS.5.OA.1.2:	Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. *For example, express the calculation "add 8 and 7, then multiply by 2" as 2 × (8 + 7). Recognize that 3 × (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.*
MAFS.5.OA.2.3:	Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. *For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.*
MAFS.K12.MP.1.1:	**Make sense of problems and persevere in solving them.** Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
MAFS.K12.MP.2.1:	**Reason abstractly and quantitatively**. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
MAFS.K12.MP.3.1:	**Construct viable arguments and critique the reasoning of others.** Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Model with mathematics. Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In

MAFS.K12.MP.4.1:	early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
MAFS.K12.MP.5.1:	**Use appropriate tools strategically.** Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
MAFS.K12.MP.6.1:	**Attend to precision.** Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
MAFS.K12.MP.7.1:	**Look for and make use of structure.** Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
MAFS.K12.MP.8.1:	**Look for and express regularity in repeated reasoning.** Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

General Course Information and Notes

GENERAL NOTES

This course supports students who need additional instruction in foundational mathematics skills as it relates to core instruction. Instruction will use explicit, systematic, and sequential approaches to mathematics instruction addressing all domains including number sense, algebraic thinking, geometry, measurement and statistical thinking. Teachers will use the listed standards that correspond to each students' needs.

Effective instruction matches instruction to the need of the students in the group and provides multiple opportunities to practice the skill and receive feedback. The additional time allotted for this course is in addition to core instruction. The intervention includes materials and strategies designed to supplement core instruction.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade-level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Number: 5012015	**Course Path: Section:** Grades PreK to 12 Education Courses > **Grade Group:** Grades PreK to 5 Education Courses > **Subject:** Mathematics > **SubSubject:**

General Mathematics >

Abbreviated Title: FDN SKILLS MATH 3-5

Course Length: Multiple (M) - Course length can vary

Course Attributes:

- Class Size Core Required

Course Level: 1

Course Status: Course Approved

Grade Level(s): 3,4,5

Educator Certifications

Prekindergarten/Primary Education (Age 3 through Grade 3)
Elementary Education (Elementary Grades 1-6)
Elementary Education (Grades K-6)
Mathematics (Elementary Grades 1-6)
Middle Grades Mathematics (Middle Grades 5-9)

Foundational Skills in Mathematics 3-5 (#5012015) 2022 - And Beyond

Course Standards

Name	Description
MA.3.AR.1.1:	Apply the distributive property to multiply a one-digit number and two-digit number. Apply properties of multiplication to find a product of one-digit whole numbers. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is to apply the associative and commutative properties of multiplication, the distributive property and name the properties. Refer to K-12 Glossary (Appendix C). *Clarification 2:* Within the benchmark, the expectation is to utilize parentheses. *Clarification 3:* Multiplication for products of three or more numbers is limited to factors within 12. Refer to Properties of Operations, Equality and Inequality (Appendix D).
MA.3.AR.1.2:	Solve one- and two-step real-world problems involving any of four operations with whole numbers. **Clarifications:** *Clarification 1:* Instruction includes understanding the context of the problem, as well as the quantities within the problem. *Clarification 2:* Multiplication is limited to factors within 12 and related division facts. Refer to Situations Involving Operations with Numbers (Appendix A).
MA.3.AR.2.1:	Restate a division problem as a missing factor problem using the relationship between multiplication and division. **Clarifications:** *Clarification 1:* Multiplication is limited to factors within 12 and related division facts. *Clarification 2:* Within this benchmark, the symbolic representation of the missing factor uses any symbol or a letter.
MA.3.AR.2.2:	Determine and explain whether an equation involving multiplication or division is true or false. **Clarifications:** *Clarification 1:* Instruction extends the understanding of the meaning of the equal sign to multiplication and division. *Clarification 2:* Problem types are limited to an equation with three or four terms. The product or quotient can be on either side of the equal sign. *Clarification 3:* Multiplication is limited to factors within 12 and related division facts.
MA.3.AR.2.3:	Determine the unknown whole number in a multiplication or division equation, relating three whole numbers, with the unknown in any position. **Clarifications:** *Clarification 1:* Instruction extends the development of algebraic thinking skills where the symbolic representation of the unknown uses any symbol or a letter. *Clarification 2:* Problems include the unknown on either side of the equal sign. *Clarification 3:* Multiplication is limited to factors within 12 and related division facts. Refer to Situations Involving Operations with Numbers (Appendix A).
MA.3.AR.3.1:	Determine and explain whether a whole number from 1 to 1,000 is even or odd. **Clarifications:** *Clarification 1:* Instruction includes determining and explaining using place value and recognizing patterns.
MA.3.AR.3.2:	Determine whether a whole number from 1 to 144 is a multiple of a given one-digit number. **Clarifications:** *Clarification 1:* Instruction includes determining if a number is a multiple of a given number by using multiplication or division.
MA.3.AR.3.3:	Identify, create and extend numerical patterns. **Clarifications:** *Clarification 1:* The expectation is to use ordinal numbers (1st, 2nd, 3rd, ...) to describe the position of a number within a sequence. *Clarification 2:* Problem types include patterns involving addition, subtraction, multiplication or division of whole numbers.
MA.3.DP.1.1:	Collect and represent numerical and categorical data with whole-number values using tables, scaled pictographs, scaled bar graphs or line plots. Use appropriate titles, labels and units. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is to complete a representation or construct a representation from a data set. *Clarification 2:* Instruction includes the connection between multiplication and the number of data points represented by a bar in scaled bar graph or a scaled column in a pictograph. *Clarification 3:* Data displays are represented both horizontally and vertically.
	Interpret data with whole-number values represented with tables, scaled pictographs, circle graphs, scaled bar graphs or line plots by solving one- and two-step problems.

MA.3.DP.1.2:	**Clarifications:** *Clarification 1:* Problems include the use of data in informal comparisons between two data sets in the same units. *Clarification 2:* Data displays can be represented both horizontally and vertically. *Clarification 3:* Circle graphs are limited to showing the total values in each category.
MA.3.FR.1.1:	Represent and interpret unit fractions in the form 1/n as the quantity formed by one part when a whole is partitioned into n equal parts. **Clarifications:** *Clarification 1:* This benchmark emphasizes conceptual understanding through the use of manipulatives or visual models. *Clarification 2:* Instruction focuses on representing a unit fraction as part of a whole, part of a set, a point on a number line, a visual model or in fractional notation. *Clarification 3:* Denominators are limited to 2, 3, 4, 5, 6, 8, 10 and 12.
MA.3.FR.1.2:	Represent and interpret fractions, including fractions greater than one, in the form of $\frac{m}{n}$ as the result of adding the unit fraction $\frac{1}{n}$ to itself m times. **Clarifications:** *Clarification 1:* Instruction emphasizes conceptual understanding through the use of manipulatives or visual models, including circle graphs, to represent fractions. *Clarification 2:* Denominators are limited to 2, 3, 4, 5, 6, 8, 10 and 12.
MA.3.FR.1.3:	Read and write fractions, including fractions greater than one, using standard form, numeral-word form and word form. **Clarifications:** *Clarification 1:* Instruction focuses on making connections to reading and writing numbers to develop the understanding that fractions are numbers and to support algebraic thinking in later grades. *Clarification 2:* Denominators are limited to 2, 3, 4, 5, 6, 8, 10 and 12.
MA.3.FR.2.1:	Plot, order and compare fractional numbers with the same numerator or the same denominator. **Clarifications:** *Clarification 1:* Instruction includes making connections between using a ruler and plotting and ordering fractions on a number line. *Clarification 2:* When comparing fractions, instruction includes an appropriately scaled number line and using reasoning about their size. *Clarification 3:* Fractions include fractions greater than one, including mixed numbers, with denominators limited to 2, 3, 4, 5, 6, 8, 10 and 12.
MA.3.FR.2.2:	Identify equivalent fractions and explain why they are equivalent. **Clarifications:** *Clarification 1:* Instruction includes identifying equivalent fractions and explaining why they are equivalent using manipulatives, drawings, and number lines. *Clarification 2:* Within this benchmark, the expectation is not to generate equivalent fractions. *Clarification 3:* Fractions are limited to fractions less than or equal to one with denominators of 2, 3, 4, 5, 6, 8, 10 and 12. Number lines must be given and scaled appropriately.
MA.3.GR.1.1:	Describe and draw points, lines, line segments, rays, intersecting lines, perpendicular lines and parallel lines. Identify these in two-dimensional figures. **Clarifications:** *Clarification 1:* Instruction includes mathematical and real-world context for identifying points, lines, line segments, rays, intersecting lines, perpendicular lines and parallel lines. *Clarification 2:* When working with perpendicular lines, right angles can be called square angles or square corners.
MA.3.GR.1.2:	Identify and draw quadrilaterals based on their defining attributes. Quadrilaterals include parallelograms, rhombi, rectangles, squares and trapezoids. **Clarifications:** *Clarification 1:* Instruction includes a variety of quadrilaterals and a variety of non-examples that lack one or more defining attributes when identifying quadrilaterals. *Clarification 2:* Quadrilaterals will be filled, outlined or both when identifying. *Clarification 3:* Drawing representations must be reasonably accurate.
MA.3.GR.1.3:	Draw line(s) of symmetry in a two-dimensional figure and identify line-symmetric two-dimensional figures. **Clarifications:** *Clarification 1:* Instruction develops the understanding that there could be no line of symmetry, exactly one line of symmetry or more than one line of symmetry. *Clarification 2:* Instruction includes folding paper along a line of symmetry so that both halves match exactly to confirm line-symmetric figures.
MA.3.GR.2.1:	Explore area as an attribute of a two-dimensional figure by covering the figure with unit squares without gaps or overlaps. Find areas of rectangles by counting unit squares. **Clarifications:** *Clarification 1:* Instruction emphasizes the conceptual understanding that area is an attribute that can be measured for a two-dimensional figure. The measurement unit for area is the area of a unit square, which is a square with side length of 1 unit. *Clarification 2:* Two-dimensional figures cannot exceed 12 units by 12 units and responses include the appropriate units in word form (e.g., square centimeter or sq.cm.).
MA.3.GR.2.2:	Find the area of a rectangle with whole-number side lengths using a visual model and a multiplication formula. **Clarifications:** *Clarification 1:* Instruction includes covering the figure with unit squares, a rectangular array or applying a formula. *Clarification 2:* Two-dimensional figures cannot exceed 12 units by 12 units and responses include the appropriate units in word form.

MA.3.GR.2.3:	Solve mathematical and real-world problems involving the perimeter and area of rectangles with whole-number side lengths using a visual model and a formula. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is not to find unknown side lengths. *Clarification 2:* Two-dimensional figures cannot exceed 12 units by 12 units and responses include the appropriate units in word form.
MA.3.GR.2.4:	Solve mathematical and real-world problems involving the perimeter and area of composite figures composed of non-overlapping rectangles with whole-number side lengths. **Clarifications:** *Clarification 1:* Composite figures must be composed of non-overlapping rectangles. *Clarification 2:* Each rectangle within the composite figure cannot exceed 12 units by 12 units and responses include the appropriate units in word form.
MA.3.M.1.1:	Select and use appropriate tools to measure the length of an object, the volume of liquid within a beaker and temperature. **Clarifications:** *Clarification 1:* Instruction focuses on identifying measurement on a linear scale, making the connection to the number line. *Clarification 2:* When measuring the length, limited to the nearest centimeter and half or quarter inch. *Clarification 3:* When measuring the temperature, limited to the nearest degree. *Clarification 4:* When measuring the volume of liquid, limited to nearest milliliter and half or quarter cup.
MA.3.M.1.2:	Solve real-world problems involving any of the four operations with whole-number lengths, masses, weights, temperatures or liquid volumes. **Clarifications:** *Clarification 1:* Within this benchmark, it is the expectation that responses include appropriate units. *Clarification 2:* Problem types are not expected to include measurement conversions. *Clarification 3:* Instruction includes the comparison of attributes measured in the same units. *Clarification 4:* Units are limited to yards, feet, inches; meters, centimeters; pounds, ounces; kilograms, grams; degrees Fahrenheit, degrees Celsius; gallons, quarts, pints, cups; and liters, milliliters.
MA.3.M.2.1:	Using analog and digital clocks tell and write time to the nearest minute using a.m. and p.m. appropriately. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is not to understand military time.
MA.3.M.2.2:	Solve one- and two-step real-world problems involving elapsed time. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is not to include crossing between a.m. and p.m.
MA.3.NSO.1.1:	Read and write numbers from 0 to 10,000 using standard form, expanded form and word form.
MA.3.NSO.1.2:	Compose and decompose four-digit numbers in multiple ways using thousands, hundreds, tens and ones. Demonstrate each composition or decomposition using objects, drawings and expressions or equations.
MA.3.NSO.1.3:	Plot, order and compare whole numbers up to 10,000. **Clarifications:** *Clarification 1:* When comparing numbers, instruction includes using an appropriately scaled number line and using place values of the thousands, hundreds, tens and ones digits. *Clarification 2:* Number lines, scaled by 50s, 100s or 1,000s, must be provided and can be a representation of any range of numbers. *Clarification 3:* Within this benchmark, the expectation is to use symbols (<, > or =).
MA.3.NSO.1.4:	Round whole numbers from 0 to 1,000 to the nearest 10 or 100.
MA.3.NSO.2.1:	Add and subtract multi-digit whole numbers including using a standard algorithm with procedural fluency.
MA.3.NSO.2.2:	Explore multiplication of two whole numbers with products from 0 to 144, and related division facts. **Clarifications:** *Clarification 1:* Instruction includes equal groups, arrays, area models and equations. *Clarification 2:* Within the benchmark, it is the expectation that one problem can be represented in multiple ways and understanding how the different representations are related to each other. *Clarification 3:* Factors and divisors are limited to up to 12.
MA.3.NSO.2.3:	Multiply a one-digit whole number by a multiple of 10, up to 90, or a multiple of 100, up to 900, with procedural reliability. **Clarifications:** *Clarification 1:* When multiplying one-digit numbers by multiples of 10 or 100, instruction focuses on methods that are based on place value.
MA.3.NSO.2.4:	Multiply two whole numbers from 0 to 12 and divide using related facts with procedural reliability. **Clarifications:** *Clarification 1:* Instruction focuses on helping a student choose a method they can use reliably.
MA.4.AR.1.1:	Solve real-world problems involving multiplication and division of whole numbers including problems in which remainders must be interpreted within the context. **Clarifications:** *Clarification 1:* Problems involving multiplication include multiplicative comparisons. Refer to Situations Involving Operations with Numbers (Appendix A). *Clarification 2:* Depending on the context, the solution of a division problem with a remainder may be the whole number part of the quotient, the whole number part of the quotient with the remainder, the whole number part of the quotient plus 1, or the remainder. *Clarification 3:* Multiplication is limited to products of up to 3 digits by 2 digits. Division is limited to up to 4 digits divided by 1 digit.

MA.4.AR.1.2:	Solve real-world problems involving addition and subtraction of fractions with like denominators, including mixed numbers and fractions greater than one. **Clarifications:** *Clarification 1:* Problems include creating real-world situations based on an equation or representing a real-world problem with a visual model or equation. *Clarification 2:* Fractions within problems must reference the same whole. *Clarification 3:* Within this benchmark, the expectation is not to simplify or use lowest terms. *Clarification 4:* Denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, 16 and 100.
MA.4.AR.1.3:	Solve real-world problems involving multiplication of a fraction by a whole number or a whole number by a fraction. **Clarifications:** *Clarification 1:* Problems include creating real-world situations based on an equation or representing a real-world problem with a visual model or equation. *Clarification 2:* Fractions within problems must reference the same whole. *Clarification 3:* Within this benchmark, the expectation is not to simplify or use lowest terms. *Clarification 4:* Fractions limited to fractions less than one with denominators of 2, 3, 4, 5, 6, 8, 10, 12, 16 and 100.
MA.4.AR.2.1:	Determine and explain whether an equation involving any of the four operations with whole numbers is true or false. **Clarifications:** *Clarification 1:* Multiplication is limited to whole number factors within 12 and related division facts.
MA.4.AR.2.2:	Given a mathematical or real-world context, write an equation involving multiplication or division to determine the unknown whole number with the unknown in any position. **Clarifications:** *Clarification 1:* Instruction extends the development of algebraic thinking skills where the symbolic representation of the unknown uses a letter. *Clarification 2:* Problems include the unknown on either side of the equal sign. *Clarification 3:* Multiplication is limited to factors within 12 and related division facts.
MA.4.AR.3.1:	Determine factor pairs for a whole number from 0 to 144. Determine whether a whole number from 0 to 144 is prime, composite or neither. **Clarifications:** *Clarification 1:* Instruction includes the connection to the relationship between multiplication and division and patterns with divisibility rules. *Clarification 2:* The numbers 0 and 1 are neither prime nor composite.
MA.4.AR.3.2:	Generate, describe and extend a numerical pattern that follows a given rule. **Clarifications:** *Clarification 1:* Instruction includes patterns within a mathematical or real-world context.
MA.4.DP.1.1:	Collect and represent numerical data, including fractional values, using tables, stem-and-leaf plots or line plots. **Clarifications:** *Clarification 1:* Denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, 16 and 100.
MA.4.DP.1.2:	Determine the mode, median or range to interpret numerical data including fractional values, represented with tables, stem-and-leaf plots or line plots. **Clarifications:** *Clarification 1:* Instruction includes interpreting data within a real-world context. *Clarification 2:* Instruction includes recognizing that data sets can have one mode, no mode or more than one mode. *Clarification 3:* Within this benchmark, data sets are limited to an odd number when calculating the median. *Clarification 4:* Denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, 16 and 100.
MA.4.DP.1.3:	Solve real-world problems involving numerical data. **Clarifications:** *Clarification 1:* Instruction includes using any of the four operations to solve problems. *Clarification 2:* Data involving fractions with like denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, 16 and 100. Fractions can be greater than one. *Clarification 3:* Data involving decimals are limited to hundredths.
MA.4.FR.1.1:	Model and express a fraction, including mixed numbers and fractions greater than one, with the denominator 10 as an equivalent fraction with the denominator 100. **Clarifications:** *Clarification 1:* Instruction emphasizes conceptual understanding through the use of manipulatives, visual models, number lines or equations.
MA.4.FR.1.2:	Use decimal notation to represent fractions with denominators of 10 or 100, including mixed numbers and fractions greater than 1, and use fractional notation with denominators of 10 or 100 to represent decimals. **Clarifications:** *Clarification 1:* Instruction emphasizes conceptual understanding through the use of manipulatives visual models, number lines or equations. *Clarification 2:* Instruction includes the understanding that a decimal and fraction that are equivalent represent the same point on the number line and that fractions with denominators of 10 or powers of 10 may be called decimal fractions.
	Identify and generate equivalent fractions, including fractions greater than one. Describe how the numerator and denominator are affected when the equivalent fraction is created.

MA.4.FR.1.3:	**Clarifications:** *Clarification 1:* Instruction includes the use of manipulatives, visual models, number lines or equations. *Clarification 2:* Instruction includes recognizing how the numerator and denominator are affected when equivalent fractions are generated.
MA.4.FR.1.4:	Plot, order and compare fractions, including mixed numbers and fractions greater than one, with different numerators and different denominators. **Clarifications:** *Clarification 1:* When comparing fractions, instruction includes using an appropriately scaled number line and using reasoning about their size. *Clarification 2:* Instruction includes using benchmark quantities, such as 0, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ and 1, to compare fractions. *Clarification 3:* Denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, 16 and 100. *Clarification 4:* Within this benchmark, the expectation is to use symbols (<, > or =).
MA.4.FR.2.1:	Decompose a fraction, including mixed numbers and fractions greater than one, into a sum of fractions with the same denominator in multiple ways. Demonstrate each decomposition with objects, drawings and equations. **Clarifications:** *Clarification 1:* Denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, 16 and 100.
MA.4.FR.2.2:	Add and subtract fractions with like denominators, including mixed numbers and fractions greater than one, with procedural reliability. **Clarifications:** *Clarification 1:* Instruction includes the use of word form, manipulatives, drawings, the properties of operations or number lines. *Clarification 2:* Within this benchmark, the expectation is not to simplify or use lowest terms. *Clarification 3:* Denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, 16 and 100.
MA.4.FR.2.3:	Explore the addition of a fraction with denominator of 10 to a fraction with denominator of 100 using equivalent fractions. **Clarifications:** *Clarification 1:* Instruction includes the use of visual models. *Clarification 2:* Within this benchmark, the expectation is not to simplify or use lowest terms.
MA.4.FR.2.4:	Extend previous understanding of multiplication to explore the multiplication of a fraction by a whole number or a whole number by a fraction. **Clarifications:** *Clarification 1:* Instruction includes the use of visual models or number lines and the connection to the commutative property of multiplication. Refer to Properties of Operation, Equality and Inequality (Appendix D). *Clarification 2:* Within this benchmark, the expectation is not to simplify or use lowest terms. *Clarification 3:* Fractions multiplied by a whole number are limited to less than 1. All denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, 16, 100.
MA.4.GR.1.1:	Informally explore angles as an attribute of two-dimensional figures. Identify and classify angles as acute, right, obtuse, straight or reflex. **Clarifications:** *Clarification 1:* Instruction includes classifying angles using benchmark angles of 90° and 180° in two-dimensional figures. *Clarification 2:* When identifying angles, the expectation includes two-dimensional figures and real-world pictures.
MA.4.GR.1.2:	Estimate angle measures. Using a protractor, measure angles in whole-number degrees and draw angles of specified measure in whole-number degrees. Demonstrate that angle measure is additive. **Clarifications:** *Clarification 1:* Instruction includes measuring given angles and drawing angles using protractors. *Clarification 2:* Instruction includes estimating angle measures using benchmark angles (30°, 45°, 60°, 90° and 180°). *Clarification 3:* Instruction focuses on the understanding that angles can be decomposed into non-overlapping angles whose measures sum to the measure of the original angle.
MA.4.GR.1.3:	Solve real-world and mathematical problems involving unknown whole-number angle measures. Write an equation to represent the unknown. **Clarifications:** *Clarification 1:* Instruction includes the connection to angle measure as being additive.
MA.4.GR.2.1:	Solve perimeter and area mathematical and real-world problems, including problems with unknown sides, for rectangles with whole-number side lengths. **Clarifications:** *Clarification 1:* Instruction extends the development of algebraic thinking where the symbolic representation of the unknown uses a letter. *Clarification 2:* Problems involving multiplication are limited to products of up to 3 digits by 2 digits. Problems involving division are limited to up to 4 digits divided by 1 digit. *Clarification 3:* Responses include the appropriate units in word form.
MA.4.GR.2.2:	Solve problems involving rectangles with the same perimeter and different areas or with the same area and different perimeters. **Clarifications:** *Clarification 1:* Instruction focuses on the conceptual understanding of the relationship between perimeter and area. *Clarification 2:* Within this benchmark, rectangles are limited to having whole-number side lengths. *Clarification 3:* Problems involving multiplication are limited to products of up to 3 digits by 2 digits. Problems involving division are limited to up to 4 digits divided by 1 digit. *Clarification 4:* Responses include the appropriate units in word form.
	Select and use appropriate tools to measure attributes of objects. **Clarifications:**

MA.4.M.1.1:	*Clarification 1:* Attributes include length, volume, weight, mass and temperature. *Clarification 2:* Instruction includes digital measurements and scales that are not linear in appearance. *Clarification 3:* When recording measurements, use fractions and decimals where appropriate.
MA.4.M.1.2:	Convert within a single system of measurement using the units: yards, feet, inches; kilometers, meters, centimeters, millimeters; pounds, ounces; kilograms, grams; gallons, quarts, pints, cups; liter, milliliter; and hours, minutes, seconds. **Clarifications:** *Clarification 1:* Instruction includes the understanding of how to convert from smaller to larger units or from larger to smaller units. *Clarification 2:* Within the benchmark, the expectation is not to convert from grams to kilograms, meters to kilometers or milliliters to liters. *Clarification 3:* Problems involving fractions are limited to denominators of 2, 3, 4, 5, 6, 8, 10, 12, 16 and 100.
MA.4.M.2.1:	Solve two-step real-world problems involving distances and intervals of time using any combination of the four operations. **Clarifications:** *Clarification 1:* Problems involving fractions will include addition and subtraction with like denominators and multiplication of a fraction by a whole number or a whole number by a fraction. *Clarification 2:* Problems involving fractions are limited to denominators of 2, 3, 4, 5, 6, 8, 10, 12, 16 and 100. *Clarification 3:* Within the benchmark, the expectation is not to use decimals.
MA.4.M.2.2:	Solve one- and two-step addition and subtraction real-world problems involving money using decimal notation.
MA.4.NSO.1.1:	Express how the value of a digit in a multi-digit whole number changes if the digit moves one place to the left or right.
MA.4.NSO.1.2:	Read and write multi-digit whole numbers from 0 to 1,000,000 using standard form, expanded form and word form.
MA.4.NSO.1.3:	Plot, order and compare multi-digit whole numbers up to 1,000,000. **Clarifications:** *Clarification 1:* When comparing numbers, instruction includes using an appropriately scaled number line and using place values of the hundred thousands, ten thousands, thousands, hundreds, tens and ones digits. *Clarification 2:* Scaled number lines must be provided and can be a representation of any range of numbers. *Clarification 3:* Within this benchmark, the expectation is to use symbols (<, > or =).
MA.4.NSO.1.4:	Round whole numbers from 0 to 10,000 to the nearest 10, 100 or 1,000.
MA.4.NSO.1.5:	Plot, order and compare decimals up to the hundredths. **Clarifications:** *Clarification 1:* When comparing numbers, instruction includes using an appropriately scaled number line and using place values of the ones, tenths and hundredths digits. *Clarification 2:* Within the benchmark, the expectation is to explain the reasoning for the comparison and use symbols (<, > or =). *Clarification 3:* Scaled number lines must be provided and can be a representation of any range of numbers.
MA.4.NSO.2.1:	Recall multiplication facts with factors up to 12 and related division facts with automaticity.
MA.4.NSO.2.2:	Multiply two whole numbers, up to three digits by up to two digits, with procedural reliability. **Clarifications:** *Clarification 1:* Instruction focuses on helping a student choose a method they can use reliably. *Clarification 2:* Instruction includes the use of models or equations based on place value and the distributive property.
MA.4.NSO.2.3:	Multiply two whole numbers, each up to two digits, including using a standard algorithm with procedural fluency.
MA.4.NSO.2.4:	Divide a whole number up to four digits by a one-digit whole number with procedural reliability. Represent remainders as fractional parts of the divisor. **Clarifications:** *Clarification 1:* Instruction focuses on helping a student choose a method they can use reliably. *Clarification 2:* Instruction includes the use of models based on place value, properties of operations or the relationship between multiplication and division.
MA.4.NSO.2.5:	Explore the multiplication and division of multi-digit whole numbers using estimation, rounding and place value. **Clarifications:** *Clarification 1:* Instruction focuses on previous understanding of multiplication with multiples of 10 and 100, and seeing division as a missing factor problem. *Clarification 2:* Estimating quotients builds the foundation for division using a standard algorithm. *Clarification 3:* When estimating the division of whole numbers, dividends are limited to up to four digits and divisors are limited to up to two digits.
MA.4.NSO.2.6:	Identify the number that is one-tenth more, one-tenth less, one-hundredth more and one-hundredth less than a given number.
MA.4.NSO.2.7:	Explore the addition and subtraction of multi-digit numbers with decimals to the hundredths. **Clarifications:** *Clarification 1:* Instruction includes the connection to money and the use of manipulatives and models based on place value.
MA.5.AR.1.1:	Solve multi-step real-world problems involving any combination of the four operations with whole numbers, including problems in which remainders must be interpreted within the context. **Clarifications:** *Clarification 1:* Depending on the context, the solution of a division problem with a remainder may be the whole number part of the quotient, the whole number part of the quotient with the remainder, the whole number part of the quotient plus 1, or the remainder.
MA.5.AR.1.2:	Solve real-world problems involving the addition, subtraction or multiplication of fractions, including mixed numbers and fractions greater than 1. **Clarifications:** *Clarification 1:* Instruction includes the use of visual models and equations to represent the problem.

MA.5.AR.1.3:	Solve real-world problems involving division of a unit fraction by a whole number and a whole number by a unit fraction. **Clarifications:** *Clarification 1:* Instruction includes the use of visual models and equations to represent the problem.
MA.5.AR.2.1:	Translate written real-world and mathematical descriptions into numerical expressions and numerical expressions into written mathematical descriptions. **Clarifications:** *Clarification 1:* Expressions are limited to any combination of the arithmetic operations, including parentheses, with whole numbers, decimals and fractions. *Clarification 2:* Within this benchmark, the expectation is not to include exponents or nested grouping symbols.
MA.5.AR.2.2:	Evaluate multi-step numerical expressions using order of operations. **Clarifications:** *Clarification 1:* Multi-step expressions are limited to any combination of arithmetic operations, including parentheses, with whole numbers, decimals and fractions. *Clarification 2:* Within this benchmark, the expectation is not to include exponents or nested grouping symbols. *Clarification 3:* Decimals are limited to hundredths. Expressions cannot include division of a fraction by a fraction.
MA.5.AR.2.3:	Determine and explain whether an equation involving any of the four operations is true or false. **Clarifications:** *Clarification 1:* Problem types include equations that include parenthesis but not nested parentheses. *Clarification 2:* Instruction focuses on the connection between properties of equality and order of operations.
MA.5.AR.2.4:	Given a mathematical or real-world context, write an equation involving any of the four operations to determine the unknown whole number with the unknown in any position. **Clarifications:** *Clarification 1:* Instruction extends the development of algebraic thinking where the unknown letter is recognized as a variable. *Clarification 2:* Problems include the unknown and different operations on either side of the equal sign
MA.5.AR.3.1:	Given a numerical pattern, identify and write a rule that can describe the pattern as an expression. **Clarifications:** *Clarification 1:* Rules are limited to one or two operations using whole numbers.
MA.5.AR.3.2:	Given a rule for a numerical pattern, use a two-column table to record the inputs and outputs. **Clarifications:** *Clarification 1:* Instruction builds a foundation for proportional and linear relationships in later grades. *Clarification 2:* Rules are limited to one or two operations using whole numbers.
MA.5.DP.1.1:	Collect and represent numerical data, including fractional and decimal values, using tables, line graphs or line plots. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is for an estimation of fractional and decimal heights on line graphs. *Clarification 2:* Decimal values are limited to hundredths. Denominators are limited to 1, 2, 3 and 4. Fractions can be greater than one.
MA.5.DP.1.2:	Interpret numerical data, with whole-number values, represented with tables or line plots by determining the mean, mode, median or range. **Clarifications:** *Clarification 1:* Instruction includes interpreting the mean in real-world problems as a leveling out, a balance point or an equal share.
MA.5.FR.1.1:	Given a mathematical or real-world problem, represent the division of two whole numbers as a fraction. **Clarifications:** *Clarification 1:* Instruction includes making a connection between fractions and division by understanding that fractions can also represent division of a numerator by a denominator. *Clarification 2:* Within this benchmark, the expectation is not to simplify or use lowest terms. *Clarification 3:* Fractions can include fractions greater than one.
MA.5.FR.2.1:	Add and subtract fractions with unlike denominators, including mixed numbers and fractions greater than 1, with procedural reliability. **Clarifications:** *Clarification 1:* Instruction includes the use of estimation, manipulatives, drawings or the properties of operations. *Clarification 2:* Instruction builds on the understanding from previous grades of factors up to 12 and their multiples.
MA.5.FR.2.2:	Extend previous understanding of multiplication to multiply a fraction by a fraction, including mixed numbers and fractions greater than 1, with procedural reliability. **Clarifications:** *Clarification 1:* Instruction includes the use of manipulatives, drawings or the properties of operations. *Clarification 2:* Denominators limited to whole numbers up to 20.
MA.5.FR.2.3:	When multiplying a given number by a fraction less than 1 or a fraction greater than 1, predict and explain the relative size of the product to the given number without calculating. **Clarifications:** *Clarification 1:* Instruction focuses on the connection to decimals, estimation and assessing the reasonableness of an answer.
MA.5.FR.2.4:	Extend previous understanding of division to explore the division of a unit fraction by a whole number and a whole number by a unit fraction. **Clarifications:** *Clarification 1:* Instruction includes the use of manipulatives, drawings or the properties of operations.

	Clarification 2: Refer to Situations Involving Operations with Numbers (Appendix A).
MA.5.GR.1.1:	Classify triangles or quadrilaterals into different categories based on shared defining attributes. Explain why a triangle or quadrilateral would or would not belong to a category. **Clarifications:** *Clarification 1:* Triangles include scalene, isosceles, equilateral, acute, obtuse and right; quadrilaterals include parallelograms, rhombi, rectangles, squares and trapezoids.
MA.5.GR.1.2:	Identify and classify three-dimensional figures into categories based on their defining attributes. Figures are limited to right pyramids, right prisms, right circular cylinders, right circular cones and spheres. **Clarifications:** *Clarification 1:* Defining attributes include the number and shape of faces, number and shape of bases, whether or not there is an apex, curved or straight edges and curved or flat faces.
MA.5.GR.2.1:	Find the perimeter and area of a rectangle with fractional or decimal side lengths using visual models and formulas. **Clarifications:** *Clarification 1:* Instruction includes finding the area of a rectangle with fractional side lengths by tiling it with squares having unit fraction side lengths and showing that the area is the same as would be found by multiplying the side lengths. *Clarification 2:* Responses include the appropriate units in word form.
MA.5.GR.3.1:	Explore volume as an attribute of three-dimensional figures by packing them with unit cubes without gaps. Find the volume of a right rectangular prism with whole-number side lengths by counting unit cubes. **Clarifications:** *Clarification 1:* Instruction emphasizes the conceptual understanding that volume is an attribute that can be measured for a three-dimensional figure. The measurement unit for volume is the volume of a unit cube, which is a cube with edge length of 1 unit.
MA.5.GR.3.2:	Find the volume of a right rectangular prism with whole-number side lengths using a visual model and a formula. **Clarifications:** *Clarification 1:* Instruction includes finding the volume of right rectangular prisms by packing the figure with unit cubes, using a visual model or applying a multiplication formula. *Clarification 2:* Right rectangular prisms cannot exceed two-digit edge lengths and responses include the appropriate units in word form.
MA.5.GR.3.3:	Solve real-world problems involving the volume of right rectangular prisms, including problems with an unknown edge length, with whole-number edge lengths using a visual model or a formula. Write an equation with a variable for the unknown to represent the problem. **Clarifications:** *Clarification 1:* Instruction progresses from right rectangular prisms to composite figures composed of right rectangular prisms. *Clarification 2:* When finding the volume of composite figures composed of right rectangular prisms, recognize volume as additive by adding the volume of non-overlapping parts. *Clarification 3:* Responses include the appropriate units in word form.
MA.5.GR.4.1:	Identify the origin and axes in the coordinate system. Plot and label ordered pairs in the first quadrant of the coordinate plane. **Clarifications:** *Clarification 1:* Instruction includes the connection between two-column tables and coordinates on a coordinate plane. *Clarification 2:* Instruction focuses on the connection of the number line to the x- and y-axis. *Clarification 3:* Coordinate planes include axes scaled by whole numbers. Ordered pairs contain only whole numbers.
MA.5.GR.4.2:	Represent mathematical and real-world problems by plotting points in the first quadrant of the coordinate plane and interpret coordinate values of points in the context of the situation. **Clarifications:** *Clarification 1:* Coordinate planes include axes scaled by whole numbers. Ordered pairs contain only whole numbers.
MA.5.M.1.1:	Solve multi-step real-world problems that involve converting measurement units to equivalent measurements within a single system of measurement. **Clarifications:** *Clarification 1:* Within the benchmark, the expectation is not to memorize the conversions. *Clarification 2:* Conversions include length, time, volume and capacity represented as whole numbers, fractions and decimals.
MA.5.M.2.1:	Solve multi-step real-world problems involving money using decimal notation.
MA.5.NSO.1.1:	Express how the value of a digit in a multi-digit number with decimals to the thousandths changes if the digit moves one or more places to the left or right.
MA.5.NSO.1.2:	Read and write multi-digit numbers with decimals to the thousandths using standard form, word form and expanded form.
MA.5.NSO.1.3:	Compose and decompose multi-digit numbers with decimals to the thousandths in multiple ways using the values of the digits in each place. Demonstrate the compositions or decompositions using objects, drawings and expressions or equations.
MA.5.NSO.1.4:	Plot, order and compare multi-digit numbers with decimals up to the thousandths. **Clarifications:** *Clarification 1:* When comparing numbers, instruction includes using an appropriately scaled number line and using place values of digits. *Clarification 2:* Scaled number lines must be provided and can be a representation of any range of numbers. *Clarification 3:* Within this benchmark, the expectation is to use symbols (<, > or =).
MA.5.NSO.1.5:	Round multi-digit numbers with decimals to the thousandths to the nearest hundredth, tenth or whole number.
MA.5.NSO.2.1:	Multiply multi-digit whole numbers including using a standard algorithm with procedural fluency.
	Divide multi-digit whole numbers, up to five digits by two digits, including using a standard algorithm with procedural fluency. Represent remainders

MA.5.NSO.2.2:	as fractions. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is not to use simplest form for fractions.
MA.5.NSO.2.3:	Add and subtract multi-digit numbers with decimals to the thousandths, including using a standard algorithm with procedural fluency.
MA.5.NSO.2.4:	Explore the multiplication and division of multi-digit numbers with decimals to the hundredths using estimation, rounding and place value. **Clarifications:** *Clarification 1:* Estimating quotients builds the foundation for division using a standard algorithm. *Clarification 2:* Instruction includes the use of models based on place value and the properties of operations.
MA.5.NSO.2.5:	Multiply and divide a multi-digit number with decimals to the tenths by one-tenth and one-hundredth with procedural reliability. **Clarifications:** *Clarification 1:* Instruction focuses on the place value of the digit when multiplying or dividing.
MA.K12.MTR.1.1:	Mathematicians who participate in effortful learning both individually and with others: • Analyze the problem in a way that makes sense given the task. • Ask questions that will help with solving the task. • Build perseverance by modifying methods as needed while solving a challenging task. • Stay engaged and maintain a positive mindset when working to solve tasks. • Help and support each other when attempting a new method or approach. **Clarifications:** Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: • Build understanding through modeling and using manipulatives. • Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. • Progress from modeling problems with objects and drawings to using algorithms and equations. • Express connections between concepts and representations. • Choose a representation based on the given context or purpose. **Clarifications:** Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations. **Clarifications:** Teachers who encourage students to complete tasks with mathematical fluency: • Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. • Offer multiple opportunities for students to practice efficient and generalizable methods. • Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: • Communicate mathematical ideas, vocabulary and methods effectively. • Analyze the mathematical thinking of others. • Compare the efficiency of a method to those expressed by others. • Recognize errors and suggest how to correctly solve the task. • Justify results by explaining methods and processes. • Construct possible arguments based on evidence. **Clarifications:** Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers.
	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem.

MA.K12.MTR.5.1:	• Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. **Clarifications:** Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. **Clarifications:** Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems. • Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. **Clarifications:** Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. **Clarifications:** K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. **Clarifications:** See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. **Clarifications:** Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. **Clarifications:** In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think _______ because ______." The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
	Use the accepted rules governing a specific format to create quality work. **Clarifications:**

ELA.K12.EE.5.1:	Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. **Clarifications:** In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

General Course Information and Notes

VERSION DESCRIPTION

This course supports students who need additional instruction in foundational mathematics skills as it relates to core instruction. Instruction will use explicit, systematic, and sequential approaches to mathematics instruction addressing all domains including number sense & operations, fractions, algebraic reasoning, geometric reasoning, measurement and data analysis & probability. Teachers will use the listed standards that correspond to each students' needs.

Effective instruction matches instruction to the need of the students in the group and provides multiple opportunities to practice the skill and receive feedback. The additional time allotted for this course is in addition to core instruction. The intervention includes materials and strategies designed to supplement core instruction.

GENERAL NOTES

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards
This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade-level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Number: 5012015

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades PreK to 5 Education Courses > **Subject:** Mathematics > **SubSubject:** General Mathematics >

Abbreviated Title: FDN SKILLS MATH 3-5

Course Length: Multiple (M) - Course length can vary

Course Attributes:

- Class Size Core Required

Course Type: Elective Course

Course Level: 1

Course Status: State Board Approved

Educator Certifications

Elementary Education (Elementary Grades 1-6)
Elementary Education (Grades K-6)
Mathematics (Elementary Grades 1-6)

Mathematics - Grade Kindergarten (#5012020) 2015 - 2022

(current)

Course Standards

MAFS.K

In Kindergarten, instructional time should focus on two critical areas: (1) representing, relating, and operating on whole numbers, initially with sets of objects; (2) describing shapes and space. More learning time in Kindergarten should be devoted to number than to other topics.

(1) Students use numbers, including written numerals, to represent quantities and to solve quantitative problems, such as counting objects in a set; counting out a given number of objects; comparing sets or numerals; and modeling simple joining and separating situations with sets of objects, or eventually with equations such as 5 + 2 = 7 and 7 – 2 = 5. (Kindergarten students should see addition and subtraction equations, and student writing of equations in kindergarten is encouraged, but it is not required.) Students choose, combine, and apply effective strategies for answering quantitative questions, including quickly recognizing the cardinals of small sets of objects, counting and producing sets of given sizes, counting the number of objects in combined sets, or counting the number of objects that remain in a set after some are taken away.

(2) Students describe their physical world using geometric ideas (e.g., shape, orientation, spatial relations) and vocabulary. They identify, name, and describe basic two-dimensional shapes, such as squares, triangles, circles, rectangles, and hexagons, presented in a variety of ways (e.g., with different sizes and orientations), as well as three-dimensional shapes such as cubes, cones, cylinders, and spheres. They use basic shapes and spatial reasoning to model objects in their environment and to construct more complex shapes.

Name	Description
MAFS.K.CC.1.1:	Count to 100 by ones and by tens.
MAFS.K.CC.1.2:	Count forward beginning from a given number within the known sequence (instead of having to begin at 1).
MAFS.K.CC.1.3:	Read and write numerals from 0 to 20. Represent a number of objects with a written numeral 0–20 (with 0 representing a count of no objects).
MAFS.K.CC.2.4:	Understand the relationship between numbers and quantities; connect counting to cardinality. a. When counting objects, say the number names in the standard order, pairing each object with one and only one number name and each number name with one and only one object. b. Understand that the last number name said tells the number of objects counted. The number of objects is the same regardless of their arrangement or the order in which they were counted. c. Understand that each successive number name refers to a quantity that is one larger.
MAFS.K.CC.2.5:	Count to answer "how many?" questions about as many as 20 things arranged in a line, a rectangular array, or a circle, or as many as 10 things in a scattered configuration; given a number from 1–20, count out that many objects.
MAFS.K.CC.3.6:	Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group, e.g., by using matching and counting strategies.
MAFS.K.CC.3.7:	Compare two numbers between 1 and 10 presented as written numerals.
MAFS.K.G.1.1:	Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as *above, below, beside, in front of, behind, and next to.*
MAFS.K.G.1.2:	Correctly name shapes regardless of their orientations or overall size.
MAFS.K.G.1.3:	Identify shapes as two-dimensional (lying in a plane, "flat") or three-dimensional ("solid").
MAFS.K.G.2.4:	Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices/"corners") and other attributes (e.g., having sides of equal length).
MAFS.K.G.2.5:	Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.
MAFS.K.G.2.6:	Compose simple shapes to form larger shapes. *For example, "Can you join these two triangles with full sides touching to make a rectangle?"*
MAFS.K.MD.1.1:	Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.
MAFS.K.MD.1.2:	Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference. *For example, directly compare the heights of two children and describe one child as taller/shorter.*
MAFS.K.MD.1.a:	Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. *Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.*
MAFS.K.MD.2.3:	Classify objects into given categories; count the numbers of objects in each category and sort the categories by count.
MAFS.K.NBT.1.1:	Compose and decompose numbers from 11 to 19 into ten ones and some further ones, e.g., by using objects or drawings, and record each composition or decomposition by a drawing or equation (e.g., 18 = 10 + 8); understand that these numbers are composed of ten ones and one, two, three, four, five, six, seven, eight, or nine ones.
MAFS.K.OA.1.1:	Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations.
MAFS.K.OA.1.2:	Solve addition and subtraction word problems[1], and add and subtract within 10, e.g., by using objects or drawings to represent the problem ([1]Students are not required to independently read the word problems.)
MAFS.K.OA.1.4:	For any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects or drawings, and record the answer with a drawing or equation.
MAFS.K.OA.1.5:	Fluently add and subtract within 5.
MAFS.K.OA.1.a:	Use addition and subtraction within 10 to solve word problems involving both addends unknown, e.g., by using objects, drawings, and equations with symbols for the unknown numbers to represent the problem. (Students are not required to independently read the word problems.)
	Make sense of problems and persevere in solving them. Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution

MAFS.K12.MP.1.1:	pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
MAFS.K12.MP.2.1:	**Reason abstractly and quantitatively**. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
MAFS.K12.MP.3.1:	**Construct viable arguments and critique the reasoning of others.** Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
MAFS.K12.MP.4.1:	**Model with mathematics.** Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
MAFS.K12.MP.5.1:	**Use appropriate tools strategically.** Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
MAFS.K12.MP.6.1:	**Attend to precision.** Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
MAFS.K12.MP.7.1:	**Look for and make use of structure.** Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
MAFS.K12.MP.8.1:	**Look for and express regularity in repeated reasoning.** Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.

LAFS.K.SL.1.1:	Participate in collaborative conversations with diverse partners about *kindergarten topics* and texts with peers and adults in small and larger groups. a. Follow agreed-upon rules for discussions (e.g., listening to others and taking turns speaking about the topics and texts under discussion). b. Continue a conversation through multiple exchanges.
LAFS.K.SL.1.2:	Confirm understanding of a text read aloud or information presented orally or through other media by asking and answering questions about key details and requesting clarification if something is not understood.
LAFS.K.SL.1.3:	Ask and answer questions in order to seek help, get information, or clarify something that is not understood.
LAFS.K.W.1.2:	Use a combination of drawing, dictating, and writing to compose informative/explanatory texts in which they name what they are writing about and supply some information about the topic.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

GENERAL NOTES

In Kindergarten, instructional time should focus on two critical areas: (1) representing and comparing whole numbers, initially with sets of objects; (2) describing shapes and space. More learning time in Kindergarten should be devoted to number than to other topics.

1. Students use numbers, including written numerals, to represent quantities and to solve quantitative problems, such as counting objects in a set; counting out a given number of objects; comparing sets or numerals; and modeling simple joining and separating situations with sets of objects, or eventually with equations such as 5 + 2 = 7 and 7 – 2 = 5. (Kindergarten students should see addition and subtraction equations, and student writing of equations in kindergarten is encouraged, but it is not required.) Students choose, combine, and apply effective strategies for answering quantitative questions, including quickly recognizing the cardinalities of small sets of objects, counting and producing sets of given sizes, counting the number of objects in combined sets, or counting the number of objects that remain in a set after some are taken away.

2. Students describe their physical world using geometric ideas (e.g., shape, orientation, spatial relations) and vocabulary. They identify, name, and describe basic two-dimensional shapes, such as squares, triangles, circles, rectangles, and hexagons, presented in a variety of ways (e.g., with different sizes and orientations), as well as three-dimensional shapes such as cubes, cones, cylinders, and spheres. They use basic shapes and spatial reasoning to model objects in their environment and to construct more complex shapes.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:
https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

Florida Standards Implementation Guide Focus Section:

The Mathematics Florida Standards Implementation Guide was created to support the teaching and learning of the Mathematics Florida Standards. The guide is compartmentalized into three components: focus, coherence, and rigor.Focus means narrowing the scope of content in each grade or course, so students achieve higher levels of understanding and experience math concepts more deeply. The Mathematics standards allow for the teaching and learning of mathematical concepts focused around major clusters at each grade level, enhanced by supporting and additional clusters. The major, supporting and additional clusters are identified, in relation to each grade or course. The cluster designations for this course are below.

Major Clusters

MAFS.K.CC.1 Know number names and the count sequence.

MAFS.K.CC.2 Count to tell the number of objects.

MAFS.K.CC.3 Compare numbers.

MAFS.K.OA.1 Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.

MAFS.K.NBT.1 Work with numbers 11-19 to gain foundations for place value.

Supporting Clusters

MAFS.K.MD.2 Classify objects and count the number of objects in each category.

MAFS.K.G.2 Analyze, compare, create, and compose shapes.

Additional Clusters

MAFS.K.MD.1 Describe and compare measurable attributes.

MAFS.K.G.1 Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres).

Note: Clusters should not be sorted from major to supporting and then taught in that order. To do so would strip the coherence of the mathematical ideas and miss the opportunity to enhance the major work of the grade with the supporting and additional clusters

GENERAL INFORMATION

Course Number: 5012020

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades PreK to 5 Education Courses > **Subject:** Mathematics > **SubSubject:** General Mathematics >

Abbreviated Title: MATH GRADE K

Course Length: Year (Y)

Course Attributes:

- Class Size Core Required

Course Type: Core Academic Course

Course Level: 2

Course Status: Course Approved

Grade Level(s): K

Educator Certifications

Prekindergarten/Primary Education (Age 3 through Grade 3)
Elementary Education (Elementary Grades 1-6)
Primary Education (K-3)
Early Childhood Education (Early Childhood)
Elementary Education (Grades K-6)

Grade Kindergarten Mathematics (#5012020) 2022 - And Beyond

Course Standards

Name	Description
MA.K.AR.1.1:	For any number from 1 to 9, find the number that makes 10 when added to the given number. **Clarifications:** *Clarification 1:* Instruction includes creating a ten using manipulatives, number lines, models and drawings.
MA.K.AR.1.2:	Given a number from 0 to 10, find the different ways it can be represented as the sum of two numbers. **Clarifications:** *Clarification 1:* Instruction includes the exploration of finding possible pairs to make a sum using manipulatives, objects, drawings and expressions; and understanding how the different representations are related to each other.
MA.K.AR.1.3:	Solve addition and subtraction real-world problems using objects, drawings or equations to represent the problem. **Clarifications:** *Clarification 1:* Instruction includes understanding the context of the problem, as well as the quantities within the problem. *Clarification 2:* Students are not expected to independently read word problems. *Clarification 3:* Addition and subtraction are limited to sums within 10 and related subtraction facts. Refer to Situations Involving Operations with Numbers (Appendix A).
MA.K.AR.2.1:	Explain why addition or subtraction equations are true using objects or drawings. **Clarifications:** *Clarification 1:* Instruction focuses on the understanding of the equal sign. *Clarification 2:* Problem types are limited to an equation with two or three terms. The sum or difference can be on either side of the equal sign. *Clarification 3:* Addition and subtraction are limited to sums within 20 and related subtraction facts.
MA.K.DP.1.1:	Collect and sort objects into categories and compare the categories by counting the objects in each category. Report the results verbally, with a written numeral or with drawings. **Clarifications:** *Clarification 1:* Instruction focuses on supporting work in counting. *Clarification 2:* Instruction includes geometric figures that can be categorized using their defining attributes. *Clarification 3:* Within this benchmark, it is not the expectation for students to construct formal representations or graphs on their own.
MA.K.GR.1.1:	Identify two- and three-dimensional figures regardless of their size or orientation. Figures are limited to circles, triangles, rectangles, squares, spheres, cubes, cones and cylinders. **Clarifications:** *Clarification 1:* Instruction includes a wide variety of circles, triangles, rectangles, squares, spheres, cubes, cones and cylinders. *Clarification 2:* Instruction includes a variety of non-examples that lack one or more defining attributes. *Clarification 3:* Two-dimensional figures can be either filled, outlined or both.
MA.K.GR.1.2:	Compare two-dimensional figures based on their similarities, differences and positions. Sort two-dimensional figures based on their similarities and differences. Figures are limited to circles, triangles, rectangles and squares. **Clarifications:** *Clarification 1:* Instruction includes exploring figures in a variety of sizes and orientations. *Clarification 2:* Instruction focuses on using informal language to describe relative positions and the similarities or differences between figures when comparing and sorting.
MA.K.GR.1.3:	Compare three-dimensional figures based on their similarities, differences and positions. Sort three-dimensional figures based on their similarities and differences. Figures are limited to spheres, cubes, cones and cylinders. **Clarifications:** *Clarification 1:* Instruction includes exploring figures in a variety of sizes and orientations. *Clarification 2:* Instruction focuses on using informal language to describe relative positions and the similarities or differences between figures when comparing and sorting.
MA.K.GR.1.4:	Find real-world objects that can be modeled by a given two- or three-dimensional figure. Figures are limited to circles, triangles, rectangles, squares, spheres, cubes, cones and cylinders.
MA.K.GR.1.5:	Combine two-dimensional figures to form a given composite figure. Figures used to form a composite shape are limited to triangles, rectangles and squares. **Clarifications:** *Clarification 1:* This benchmark is intended to develop the understanding of spatial relationships.
MA.K.M.1.1:	Identify the attributes of a single object that can be measured such as length, volume or weight. **Clarifications:** *Clarification 1:* Within this benchmark, measuring is not required.
	Directly compare two objects that have an attribute which can be measured in common. Express the comparison using language to describe the difference.

MA.K.M.1.2:	**Clarifications:** *Clarification 1:* To directly compare length, objects are placed next to each other with one end of each object lined up to determine which one is longer. *Clarification 2:* Language to compare length includes short, shorter, long, longer, tall, taller, high or higher. Language to compare volume includes has more, has less, holds more, holds less, more full, less full, full, empty, takes up more space or takes up less space. Language to compare weight includes heavy, heavier, light, lighter, weighs more or weighs less.
MA.K.M.1.3:	Express the length of an object, up to 20 units long, as a whole number of lengths by laying non-standard objects end to end with no gaps or overlaps. **Clarifications:** *Clarification 1:* Non-standard units of measurement are units that are not typically used, such as paper clips or colored tiles. To measure with non-standard units, students lay multiple copies of the same object end to end with no gaps or overlaps. The length is shown by the number of objects needed.
MA.K.NSO.1.1:	Given a group of up to 20 objects, count the number of objects in that group and represent the number of objects with a written numeral. State the number of objects in a rearrangement of that group without recounting. **Clarifications:** *Clarification 1:* Instruction focuses on developing an understanding of cardinality and one-to-one correspondence. *Clarification 2:* Instruction includes counting objects and pictures presented in a line, rectangular array, circle or scattered arrangement. Objects presented in a scattered arrangement are limited to 10. *Clarification 3:* Within this benchmark, the expectation is not to write the number in word form.
MA.K.NSO.1.2:	Given a number from 0 to 20, count out that many objects. **Clarifications:** *Clarification 1:* Instruction includes giving a number verbally or with a written numeral.
MA.K.NSO.1.3:	Identify positions of objects within a sequence using the words “first,” “second,” “third,” “fourth” or “fifth.” **Clarifications:** *Clarification 1:* Instruction includes the understanding that rearranging a group of objects does not change the total number of objects but may change the order of an object in that group.
MA.K.NSO.1.4:	Compare the number of objects from 0 to 20 in two groups using the terms less than, equal to or greater than. **Clarifications:** *Clarification 1:* Instruction focuses on matching, counting and the connection to addition and subtraction. *Clarification 2:* Within this benchmark, the expectation is not to use the relational symbols =,> or <.
MA.K.NSO.2.1:	Recite the number names to 100 by ones and by tens. Starting at a given number, count forward within 100 and backward within 20. **Clarifications:** *Clarification 1:* When counting forward by ones, students are to say the number names in the standard order and understand that each successive number refers to a quantity that is one larger. When counting backward, students are to understand that each succeeding number in the count sequence refers to a quantity that is one less. *Clarification 2:* Within this benchmark, the expectation is to recognize and count to 100 by the end of Kindergarten.
MA.K.NSO.2.2:	Represent whole numbers from 10 to 20, using a unit of ten and a group of ones, with objects, drawings and expressions or equations.
MA.K.NSO.2.3:	Locate, order and compare numbers from 0 to 20 using the number line and terms less than, equal to or greater than. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is not to use the relational symbols =,> or <. *Clarification 2:* When comparing numbers from 0 to 20, both numbers are plotted on the same number line. *Clarification 3:* When locating numbers on the number line, the expectation includes filling in a missing number by counting from left to right on the number line.
MA.K.NSO.3.1:	Explore addition of two whole numbers from 0 to 10, and related subtraction facts. **Clarifications:** *Clarification 1:* Instruction includes objects, fingers, drawings, number lines and equations. *Clarification 2:* Instruction focuses on the connection that addition is “putting together” or “counting on” and that subtraction is “taking apart” or “taking from.” Refer to Situations Involving Operations with Numbers (Appendix A). *Clarification 3:* Within this benchmark, it is the expectation that one problem can be represented in multiple ways and understanding how the different representations are related to each other.
MA.K.NSO.3.2:	Add two one-digit whole numbers with sums from 0 to 10 and subtract using related facts with procedural reliability. **Clarifications:** *Clarification 1:* Instruction focuses on helping a student choose a method they can use reliably.
MA.K12.MTR.1.1:	Mathematicians who participate in effortful learning both individually and with others: • Analyze the problem in a way that makes sense given the task. • Ask questions that will help with solving the task. • Build perseverance by modifying methods as needed while solving a challenging task. • Stay engaged and maintain a positive mindset when working to solve tasks. • Help and support each other when attempting a new method or approach. **Clarifications:** Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students’ ability to analyze and problem solve. • Recognize students’ effort when solving challenging problems.

MA.K12.MTR.2.1:	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: • Build understanding through modeling and using manipulatives. • Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. • Progress from modeling problems with objects and drawings to using algorithms and equations. • Express connections between concepts and representations. • Choose a representation based on the given context or purpose. **Clarifications:** Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations. **Clarifications:** Teachers who encourage students to complete tasks with mathematical fluency: • Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. • Offer multiple opportunities for students to practice efficient and generalizable methods. • Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: • Communicate mathematical ideas, vocabulary and methods effectively. • Analyze the mathematical thinking of others. • Compare the efficiency of a method to those expressed by others. • Recognize errors and suggest how to correctly solve the task. • Justify results by explaining methods and processes. • Construct possible arguments based on evidence. **Clarifications:** Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. **Clarifications:** Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. **Clarifications:** Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.

MA.K12.MTR.7.1:	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems. • Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. **Clarifications:** Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. **Clarifications:** K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. **Clarifications:** See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. **Clarifications:** Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. **Clarifications:** In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think _______ because ______." The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. **Clarifications:** Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. **Clarifications:** In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

VERSION DESCRIPTION

The benchmarks in this course are mastery goals that students are expected to attain by the end of the year. To build mastery, students will continue to review and apply earlier grade-level benchmarks and expectations.

GENERAL NOTES

In Kindergarten, instructional time will emphasize three areas: (1) developing an understanding of counting to represent the total number of objects in a set and to order the objects within a set; (2) developing an understanding of addition and subtraction and the relationship of these operations to counting and (3) measuring, comparing and categorizing objects according to various attributes, including their two- and three-dimensional shapes.

Curricular content for all subjects must integrate critical-thinking, problem-solving, and workforce-literacy skills; communication, reading, and writing skills; mathematics skills; collaboration skills; contextual and applied-learning skills; technology-literacy skills; information and media-literacy skills; and civic-engagement skills.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:
https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Number: 5012020

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades PreK to 5 Education Courses > **Subject:** Mathematics > **SubSubject:** General Mathematics >

Abbreviated Title: GRADE K MATH

Course Length: Year (Y)

Course Type: Core Academic Course

Course Level: 2

Course Status: State Board Approved

Educator Certifications

Prekindergarten/Primary Education (Age 3 through Grade 3)
Elementary Education (Elementary Grades 1-6)
Primary Education (K-3)
Early Childhood Education (Early Childhood)
Elementary Education (Grades K-6)

Mathematics - Grade One (#5012030) 2015 - 2022 (current)

Course Standards

MAFS.1

In Grade 1, instructional time should focus on four critical areas: (1) developing understanding of addition, subtraction, and strategies for addition and subtraction within 20; (2) developing understanding of whole number relationships and place value, including grouping in tens and ones; (3) developing understanding of linear measurement and measuring lengths as iterating length units; and (4) reasoning about attributes of, and composing and decomposing geometric shapes.

1. Students develop strategies for adding and subtracting whole numbers based on their prior work with small numbers. They use a variety of models, including discrete objects and length-based models (e.g., cubes connected to form lengths), to model add-to, take-from, put-together, take-apart, and compare situations to develop meaning for the operations of addition and subtraction, and to develop strategies to solve arithmetic problems with these operations. Students understand connections between counting and addition and subtraction (e.g., adding two is the same as counting on two). They use properties of addition to add whole numbers and to create and use increasingly sophisticated strategies based on these properties (e.g., "making tens") to solve addition and subtraction problems within 20. By comparing a variety of solution strategies, children build their understanding of the relationship between addition and subtraction.
2. Students develop, discuss, and use efficient, accurate, and generalizable methods to add within 100 and subtract multiples of 10. They compare whole numbers (at least to 100) to develop understanding of and solve problems involving their relative sizes. They think of whole numbers between 10 and 100 in terms of tens and ones (especially recognizing the numbers 11 to 19 as composed of a ten and some ones). Through activities that build number sense, they understand the order of the counting numbers and their relative magnitudes.
3. Students develop an understanding of the meaning and processes of measurement, including underlying concepts such as iterating (the mental activity of building up the length of an object with equal-sized units) and the transitivity principle for indirect measurement. Note: Students should apply the principle of transitivity of measurement to make indirect comparisons, but they need not use this technical term.
4. Students compose and decompose plane or solid figures (e.g., put two triangles together to make a quadrilateral) and build understanding of part-whole relationships as well as the properties of the original and composite shapes. As they combine shapes, they recognize them from different perspectives and orientations, describe their geometric attributes, and determine how they are alike and different, to develop the background for measurement and for initial understandings of properties such as congruence and symmetry.

Name	Description
MAFS.1.G.1.1:	Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size); build and draw shapes to possess defining attributes.
MAFS.1.G.1.2:	Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape.
MAFS.1.G.1.3:	Partition circles and rectangles into two and four equal shares, describe the shares using the words *halves*, *fourths*, and *quarters*, and use the phrases *half of*, *fourth of*, and *quarter of*. Describe the whole as two of, or four of the shares. Understand for these examples that decomposing into more equal shares creates smaller shares.
MAFS.1.MD.1.1:	Order three objects by length; compare the lengths of two objects indirectly by using a third object.
MAFS.1.MD.1.a:	Understand how to use a ruler to measure length to the nearest inch. a. Recognize that the ruler is a tool that can be used to measure the attribute of length. b. Understand the importance of the zero point and end point and that the length measure is the span between two points. c. Recognize that the units marked on a ruler have equal length intervals and fit together with no gaps or overlaps. These equal interval distances can be counted to determine the overall length of an object.
MAFS.1.MD.2.3:	Tell and write time in hours and half-hours using analog and digital clocks.
MAFS.1.MD.2.a:	Identify and combine values of money in cents up to one dollar working with a single unit of currency[1]. a. Identify the value of coins (pennies, nickels, dimes, quarters). b. Compute the value of combinations of coins (pennies and/or dimes). c. Relate the value of pennies, dimes, and quarters to the dollar (e.g., There are 100 pennies *or* ten dimes *or* four quarters in one dollar.) ([1]Students are not expected to understand the decimal notation for combinations of dollars and cents.)
MAFS.1.MD.3.4:	Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.
MAFS.1.NBT.1.1:	Count to 120, starting at any number less than 120. In this range, read and write numerals and represent a number of objects with a written numeral.
MAFS.1.NBT.2.2:	Understand that the two digits of a two-digit number represent amounts of tens and ones. a. 10 can be thought of as a bundle of ten ones — called a "ten." b. The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones. c. The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones). d. Decompose two-digit numbers in multiple ways (e.g., 64 can be decomposed into 6 tens and 4 ones or into 5 tens and 14 ones).
MAFS.1.NBT.2.3:	Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols >, =, and <.
MAFS.1.NBT.3.4:	Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten.
MAFS.1.NBT.3.5:	Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used.
MAFS.1.NBT.3.6:	Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or zero differences), using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a

	written method and explain the reasoning used.
MAFS.1.OA.1.1:	Use addition and subtraction within 20 to solve word problems[1] involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem ([1]Students are not required to independently read the word problems.)
MAFS.1.OA.1.2:	Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.
MAFS.1.OA.2.3:	Apply properties of operations as strategies to add and subtract. *Examples: If 8 + 3 = 11 is known, then 3 + 8 = 11 is also known. (Commutative property of addition.) To add 2 + 6 + 4, the second two numbers can be added to make a ten, so 2 + 6 + 4 = 2 + 10 = 12. (Associative property of addition.)*
MAFS.1.OA.2.4:	Understand subtraction as an unknown-addend problem. *For example, subtract 10 – 8 by finding the number that makes 10 when added to 8.*
MAFS.1.OA.3.5:	Relate counting to addition and subtraction (e.g., by counting on 2 to add 2).
MAFS.1.OA.3.6:	Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., 8 + 6 = 8 + 2 + 4 = 10 + 4 = 14); decomposing a number leading to a ten (e.g., 13 – 4 = 13 – 3 – 1 = 10 – 1 = 9); using the relationship between addition and subtraction (e.g., knowing that 8 + 4 = 12, one knows 12 – 8 = 4); and creating equivalent but easier or known sums (e.g., adding 6 + 7 by creating the known equivalent 6 + 6 + 1 = 12 + 1 = 13).
MAFS.1.OA.4.7:	Understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false. *For example, which of the following equations are true and which are false? 6 = 6, 7 = 8 – 1, 5 + 2 = 2 + 5, 4 + 1 = 5 + 2.*
MAFS.1.OA.4.8:	Determine the unknown whole number in an addition or subtraction equation relating to three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations 8 + ? = 11, 5 = [] – 3, 6 + 6 = [].*
MAFS.K12.MP.1.1:	**Make sense of problems and persevere in solving them.** Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
MAFS.K12.MP.2.1:	**Reason abstractly and quantitatively**. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
MAFS.K12.MP.3.1:	**Construct viable arguments and critique the reasoning of others.** Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
MAFS.K12.MP.4.1:	**Model with mathematics.** Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
MAFS.K12.MP.5.1:	**Use appropriate tools strategically.** Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
	Attend to precision. Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful

MAFS.K12.MP.6.1:	about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
MAFS.K12.MP.7.1:	**Look for and make use of structure.** Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
MAFS.K12.MP.8.1:	**Look for and express regularity in repeated reasoning.** Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
LAFS.1.SL.1.1:	Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups. a. Follow agreed-upon rules for discussions (e.g., listening to others with care, speaking one at a time about the topics and texts under discussion). b. Build on others' talk in conversations by responding to the comments of others through multiple exchanges. c. Ask questions to clear up any confusion about the topics and texts under discussion.
LAFS.1.SL.1.2:	Ask and answer questions about key details in a text read aloud or information presented orally or through other media.
LAFS.1.SL.1.3:	Ask and answer questions about what a speaker says in order to gather additional information or clarify something that is not understood.
LAFS.K12.W.1.2:	Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

GENERAL NOTES

In Grade 1, instructional time should focus on four critical areas: (1) developing understanding of addition, subtraction, and strategies for addition and subtraction within 20; (2) developing understanding of whole number relationships and place value, including grouping in tens and ones; (3) developing understanding of linear measurement and measuring lengths as iterating length units; and (4) reasoning about attributes of, and composing and decomposing geometric shapes.

1. Students develop strategies for adding and subtracting whole numbers based on their prior work with small numbers. They use a variety of models, including discrete objects and length-based models (e.g., cubes connected to form lengths), to model add-to, take-from, put-together, take-apart, and compare situations to develop meaning for the operations of addition and subtraction, and to develop strategies to solve arithmetic problems with these operations. Students understand connections between counting and addition and subtraction (e.g., adding two is the same as counting on two). They use properties of addition to add whole numbers and to create and use increasingly sophisticated strategies based on these properties (e.g., "making tens") to solve addition and subtraction problems within 20. By comparing a variety of solution strategies, children build their understanding of the relationship between addition and subtraction.

2. Students develop, discuss, and use efficient, accurate, and generalizable methods to add within 100 and subtract multiples of 10. They compare whole numbers (at least to 100) to develop understanding of and solve problems involving their relative sizes. They think of whole numbers between 10 and 100 in terms of tens and ones (especially recognizing the numbers 11 to 19 as composed of a ten and some ones). Through activities that build number sense, they understand the order of the counting numbers and their relative magnitudes.

3. Students develop an understanding of the meaning and processes of measurement, including underlying concepts such as iterating (the mental activity of building up the length of an object with equal-sized units) and the transitivity principle for indirect measurement.

4. Students compose and decompose plane or solid figures (e.g., put two triangles together to make a quadrilateral) and build understanding of part-whole relationships as well as the properties of the original and composite shapes. As they combine shapes, they recognize them from different perspectives and orientations, describe their geometric attributes, and determine how they are alike and different, to develop the background for measurement and for initial understandings of properties such as congruence and symmetry.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:
https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

Florida Standards Implementation Guide Focus Section:

The Mathematics Florida Standards Implementation Guide was created to support the teaching and learning of the Mathematics Florida Standards. The guide is compartmentalized into three components: focus, coherence, and rigor.Focus means narrowing the scope of content in each grade or course, so students achieve higher levels of understanding and experience math concepts more deeply. The Mathematics standards allow for the teaching and learning of mathematical concepts focused around major clusters at each grade level, enhanced by supporting and additional clusters. The major, supporting and additional clusters are identified, in relation to each grade or course. The cluster designations for this course are below.

Major Clusters

MAFS.1.OA.1 Represent and solve problems involving addition and subtraction.

MAFS.1.OA.2 Understand and apply properties of operations and the relationship between addition and subtraction.

MAFS.1.OA.3 Add and subtract within 20.

MAFS.1.OA.4 Work with addition and subtraction equations.

MAFS.1.NBT.1 Extend the counting sequence.

MAFS.1.NBT.2 Understand place value.

MAFS.1.NBT.3 Use place value understanding and properties of operations to add and subtract.

MAFS.1.MD.1 Measure lengths indirectly and by iterating length units.

Supporting Clusters

MAFS.1.MD.3 Represent and interpret data.

Additional Clusters

MAFS.1.MD.2 Work with time and money.

MAFS.1.G.1 Reason with shapes and their attributes.

Note: Clusters should not be sorted from major to supporting and then taught in that order. To do so would strip the coherence of the mathematical ideas and miss the opportunity to enhance the major work of the grade with the supporting and additional clusters.

GENERAL INFORMATION

Course Number: 5012030

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades PreK to 5 Education Courses > **Subject:** Mathematics > **SubSubject:** General Mathematics >

Abbreviated Title: MATH GRADE ONE

Course Length: Year (Y)

Course Attributes:

- Class Size Core Required

Course Type: Core Academic Course

Course Status: Course Approved

Grade Level(s): 1

Educator Certifications

Prekindergarten/Primary Education (Age 3 through Grade 3)
Elementary Education (Elementary Grades 1-6)
Primary Education (K-3)
Mathematics (Elementary Grades 1-6)
Elementary Education (Grades K-6)

Grade One Mathematics (#5012030) 2022 - And Beyond

Course Standards

Name	Description
MA.1.AR.1.1:	Apply properties of addition to find a sum of three or more whole numbers. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is to apply the associative and commutative properties of addition. It is not the expectation to name the properties or use parentheses. Refer to Properties of Operations, Equality and Inequality (Appendix D). *Clarification 2:* Instruction includes emphasis on using the properties to make a ten when adding three or more numbers. *Clarification 3:* Addition is limited to sums within 20.
MA.1.AR.1.2:	Solve addition and subtraction real-world problems using objects, drawings or equations to represent the problem. **Clarifications:** *Clarification 1:* Instruction includes understanding the context of the problem, as well as the quantities within the problem. *Clarification 2:* Students are not expected to independently read word problems. *Clarification 3:* Addition and subtraction are limited to sums within 20 and related subtraction facts. Refer to Situations Involving Operations with Numbers (Appendix A).
MA.1.AR.2.1:	Restate a subtraction problem as a missing addend problem using the relationship between addition and subtraction. **Clarifications:** *Clarification 1:* Addition and subtraction are limited to sums within 20 and related subtraction facts.
MA.1.AR.2.2:	Determine and explain if equations involving addition or subtraction are true or false. **Clarifications:** *Clarification 1:* Instruction focuses on understanding of the equal sign. *Clarification 2:* Problem types are limited to an equation with no more than four terms. The sum or difference can be on either side of the equal sign. *Clarification 3:* Addition and subtraction are limited to sums within 20 and related subtraction facts.
MA.1.AR.2.3:	Determine the unknown whole number in an addition or subtraction equation, relating three whole numbers, with the unknown in any position. **Clarifications:** *Clarification 1:* Instruction begins the development of algebraic thinking skills where the symbolic representation of the unknown uses any symbol other than a letter. *Clarification 2:* Problems include the unknown on either side of the equal sign. *Clarification 3:* Addition and subtraction are limited to sums within 20 and related subtraction facts. Refer to Situations Involving Operations with Numbers (Appendix A).
MA.1.DP.1.1:	Collect data into categories and represent the results using tally marks or pictographs. **Clarifications:** *Clarification 1:* Instruction includes connecting tally marks to counting by 5s. *Clarification 2:* Data sets include geometric figures that are categorized using their defining attributes and data from the classroom or school. *Clarification 3:* Pictographs are limited to single-unit scales.
MA.1.DP.1.2:	Interpret data represented with tally marks or pictographs by calculating the total number of data points and comparing the totals of different categories. **Clarifications:** *Clarification 1:* Instruction focuses on the connection to addition and subtraction when calculating the total and comparing, respectively.
MA.1.FR.1.1:	Partition circles and rectangles into two and four equal-sized parts. Name the parts of the whole using appropriate language including halves or fourths. **Clarifications:** *Clarification 1:* This benchmark does not require writing the equal sized parts as a fraction with a numerator and denominator.
MA.1.GR.1.1:	Identify, compare and sort two- and three-dimensional figures based on their defining attributes. Figures are limited to circles, semi-circles, triangles, rectangles, squares, trapezoids, hexagons, spheres, cubes, rectangular prisms, cones and cylinders. **Clarifications:** *Clarification 1:* Instruction focuses on the defining attributes of a figure: whether it is closed or not; number of vertices, sides, edges or faces; and if it contains straight, curved or equal length sides or edges. *Clarification 2:* Instruction includes figures given in a variety of sizes, orientations and non-examples that lack one or more defining attributes. *Clarification 3:* Within this benchmark, the expectation is not to sort a combination of two- and three-dimensional figures at the same time or to define the attributes of trapezoids. *Clarification 4:* Instruction includes using formal and informal language to describe the defining attributes of figures when comparing and sorting.
MA.1.GR.1.2:	Sketch two-dimensional figures when given defining attributes. Figures are limited to triangles, rectangles, squares and hexagons.
	Compose and decompose two- and three-dimensional figures. Figures are limited to semi-circles, triangles, rectangles, squares, trapezoids,

MA.1.GR.1.3:	hexagons, cubes, rectangular prisms, cones and cylinders. **Clarifications:** *Clarification 1:* Instruction focuses on the understanding of spatial relationships relating to part-whole, and on the connection to breaking apart numbers and putting them back together. *Clarification 2:* Composite figures are composed without gaps or overlaps. *Clarification 3:* Within this benchmark, it is not the expectation to compose two- and three- dimensional figures at the same time.
MA.1.GR.1.4:	Given a real-world object, identify parts that are modeled by two- and three-dimensional figures. Figures are limited to semi-circles, triangles, rectangles, squares and hexagons, spheres, cubes, rectangular prisms, cones and cylinders.
MA.1.M.1.1:	Estimate the length of an object to the nearest inch. Measure the length of an object to the nearest inch or centimeter. **Clarifications:** *Clarification 1:* Instruction emphasizes measuring from the zero point of the ruler. The markings on the ruler indicate the unit of length by marking equal distances with no gaps or overlaps. *Clarification 2:* When estimating length, the expectation is to give a reasonable number of inches for the length of a given object.
MA.1.M.1.2:	Compare and order the length of up to three objects using direct and indirect comparison. **Clarifications:** *Clarification 1:* When directly comparing objects, the objects can be placed side by side or they can be separately measured in the same units and the measurements can be compared. *Clarification 2:* Two objects can be compared indirectly by directly comparing them to a third object.
MA.1.M.2.1:	Using analog and digital clocks, tell and write time in hours and half-hours. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is not to understand military time or to use a.m. or p.m. *Clarification 2:* Instruction includes the connection to partitioning circles into halves and to semi-circles.
MA.1.M.2.2:	Identify pennies, nickels, dimes and quarters, and express their values using the ¢ symbol. State how many of each coin equal a dollar. **Clarifications:** *Clarification 1:* Instruction includes the recognition of both sides of a coin. *Clarification 2:* Within this benchmark, the expectation is not to use decimal values.
MA.1.M.2.3:	Find the value of combinations of pennies, nickels and dimes up to one dollar, and the value of combinations of one, five and ten dollar bills up to $100. Use the ¢ and $ symbols appropriately. **Clarifications:** *Clarification 1:* Instruction includes the identification of a one, five and ten-dollar bill and the computation of the value of combinations of pennies, nickels and dimes or one, five and ten dollar bills. *Clarification 2:* Instruction focuses on the connection to place value and skip counting. *Clarification 3:* Within this benchmark, the expectation is not to use decimal values or to find the value of a combination of coins and dollars.
MA.1.NSO.1.1:	Starting at a given number, count forward and backwards within 120 by ones. Skip count by 2s to 20 and by 5s to 100. **Clarifications:** *Clarification 1:* Instruction focuses on the connection to addition as “counting on” and subtraction as “counting back”. *Clarification 2:*Instruction also focuses on the recognition of patterns within skip counting which helps build a foundation for multiplication in later grades. *Clarification 3:* Instruction includes recognizing counting sequences using visual charts, such as a 120 chart, to emphasize base 10 place value.
MA.1.NSO.1.2:	Read numbers from 0 to 100 written in standard form, expanded form and word form. Write numbers from 0 to 100 using standard form and expanded form.
MA.1.NSO.1.3:	Compose and decompose two-digit numbers in multiple ways using tens and ones. Demonstrate each composition or decomposition with objects, drawings and expressions or equations.
MA.1.NSO.1.4:	Plot, order and compare whole numbers up to 100. **Clarifications:** *Clarification 1:* When comparing numbers, instruction includes using a number line and using place values of the tens and ones digits. *Clarification 2:* Within this benchmark, the expectation is to use terms (e.g., less than, greater than, between or equal to) and symbols (<, > or =).
MA.1.NSO.2.1:	Recall addition facts with sums to 10 and related subtraction facts with automaticity.
MA.1.NSO.2.2:	Add two whole numbers with sums from 0 to 20, and subtract using related facts with procedural reliability. **Clarifications:** *Clarification 1:* Instruction focuses on helping a student choose a method they can use reliably. *Clarification 2:* Instruction includes situations involving adding to, putting together, comparing and taking from.
MA.1.NSO.2.3:	Identify the number that is one more, one less, ten more and ten less than a given two-digit number.
MA.1.NSO.2.4:	Explore the addition of a two-digit number and a one-digit number with sums to 100. **Clarifications:** *Clarification 1:* Instruction focuses on combining ones and tens and composing new tens from ones, when needed. *Clarification 2:* Instruction includes the use of manipulatives, number lines, drawings or models.
MA.1.NSO.2.5:	Explore subtraction of a one-digit number from a two-digit number. **Clarifications:** *Clarification 1:* Instruction focuses on utilizing the number line as a tool for subtraction through “counting on” or “counting back”. The process of counting on highlights subtraction as a missing addend problem. *Clarification 2:* Instruction includes the use of manipulatives, drawings or equations to decompose tens and regroup ones, when needed.

MA.K12.MTR.1.1:	Mathematicians who participate in effortful learning both individually and with others: • Analyze the problem in a way that makes sense given the task. • Ask questions that will help with solving the task. • Build perseverance by modifying methods as needed while solving a challenging task. • Stay engaged and maintain a positive mindset when working to solve tasks. • Help and support each other when attempting a new method or approach. **Clarifications:** Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students’ ability to analyze and problem solve. • Recognize students’ effort when solving challenging problems.
MA.K12.MTR.2.1:	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: • Build understanding through modeling and using manipulatives. • Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. • Progress from modeling problems with objects and drawings to using algorithms and equations. • Express connections between concepts and representations. • Choose a representation based on the given context or purpose. **Clarifications:** Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations. **Clarifications:** Teachers who encourage students to complete tasks with mathematical fluency: • Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. • Offer multiple opportunities for students to practice efficient and generalizable methods. • Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: • Communicate mathematical ideas, vocabulary and methods effectively. • Analyze the mathematical thinking of others. • Compare the efficiency of a method to those expressed by others. • Recognize errors and suggest how to correctly solve the task. • Justify results by explaining methods and processes. • Construct possible arguments based on evidence. **Clarifications:** Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students’ ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. **Clarifications:** Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students’ ability to construct relationships between their current understanding and more sophisticated ways of thinking.

MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. **Clarifications:** Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems. • Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. **Clarifications:** Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. **Clarifications:** K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. **Clarifications:** See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. **Clarifications:** Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. **Clarifications:** In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think _______ because ______." The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. **Clarifications:** Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. **Clarifications:** In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

VERSION DESCRIPTION

The benchmarks in this course are mastery goals that students are expected to attain by the end of the year. To build mastery, students will continue to review and apply earlier grade-level benchmarks and expectations.

GENERAL NOTES

In grade 1, instructional time will emphasize four areas: (1) understanding the place value of tens and ones within two-digit whole numbers; (2) extending understanding of addition and subtraction and the relationship between them; (3) developing an understanding of measurement of physical objects, money and time and (4) categorizing, composing and decomposing geometric figures.

Curricular content for all subjects must integrate critical-thinking, problem-solving, and workforce-literacy skills; communication, reading, and writing skills; mathematics skills; collaboration skills; contextual and applied-learning skills; technology-literacy skills; information and media-literacy skills; and civic-engagement skills.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:
https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Number: 5012030

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades PreK to 5 Education Courses > **Subject:** Mathematics > **SubSubject:** General Mathematics >

Abbreviated Title: GRADE ONE MATH

Course Length: Year (Y)

Course Type: Core Academic Course
Course Status: State Board Approved

Educator Certifications

Prekindergarten/Primary Education (Age 3 through Grade 3)
Elementary Education (Elementary Grades 1-6)
Primary Education (K-3)
Mathematics (Elementary Grades 1-6)
Elementary Education (Grades K-6)

Mathematics - Grade Two (#5012040) 2015 - 2022 (current)

Course Standards

MAFS.2

In Grade 2, instructional time should focus on four critical areas: (1) extending understanding of base-ten notation; (2) building fluency with addition and subtraction; (3) using standard units of measure; and (4) describing and analyzing shapes.

1. Students extend their understanding of the base-ten system. This includes ideas of counting in fives, tens, and multiples of hundreds, tens, and ones, as well as number relationships involving these units, including comparing. Students understand multi-digit numbers (up to 1000) written in base-ten notation, recognizing that the digits in each place represent amounts of thousands, hundreds, tens, or ones (e.g., 853 is 8 hundreds + 5 tens + 3 ones).
2. Students use their understanding of addition to develop fluency with addition and subtraction within 100. They solve problems within 1000 by applying their understanding of models for addition and subtraction, and they develop, discuss, and use efficient, accurate, and generalization methods to compute sums and differences of whole numbers in base-ten notation, using their understanding of place value and the properties of operations. They select and accurately apply methods that are appropriate for the context and the numbers involved to mentally calculate sums and differences for numbers with only tens or only hundreds.
3. Students recognize the need for standard units of measure (centimeter and inch) and they use rulers and other measurement tools with the understanding that linear measure involves an iteration of units. They recognize that the smaller the unit, the more iterations they need to cover a given length.
4. Students describe and analyze shapes by examining their sides and angles. Students investigate, describe, and reason about decomposing and combining shapes to make other shapes. Through building, drawing, and analyzing two-and three-dimensional shapes, students develop a foundation for understanding area, volume, congruence, similarity, and symmetry in later grades.

Name	Description
MAFS.2.G.1.1:	Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces. Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.
MAFS.2.G.1.2:	Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.
MAFS.2.G.1.3:	Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words *halves, thirds, half of, a third of,* etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape.
MAFS.2.MD.1.1:	Measure the length of an object to the nearest inch, foot, centimeter, or meter by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.
MAFS.2.MD.1.2:	Describe the inverse relationship between the size of a unit and number of units needed to measure a given object. *Example: Suppose the perimeter of a room is lined with one-foot rulers. Now, suppose we want to line it with yardsticks instead of rulers. Will we need more or fewer yardsticks than rulers to do the job? Explain your answer.*
MAFS.2.MD.1.3:	Estimate lengths using units of inches, feet, yards, centimeters, and meters.
MAFS.2.MD.1.4:	Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.
MAFS.2.MD.2.5:	Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem.
MAFS.2.MD.2.6:	Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, ..., and represent whole-number sums and differences within 100 on a number line diagram.
MAFS.2.MD.3.7:	Tell and write time from analog and digital clocks to the nearest five minutes.
MAFS.2.MD.3.8:	Solve one- and two-step word problems involving dollar bills (singles, fives, tens, twenties, and hundreds) or coins (quarters, dimes, nickels, and pennies) using $ and ¢ symbols appropriately. Word problems may involve addition, subtraction, and equal groups situations[1]. *Example: The cash register shows that the total for your purchase is 59¢. You gave the cashier three quarters. How much change should you receive from the cashier?* a. Identify the value of coins and paper currency. b. Compute the value of any combination of coins within one dollar. c. Compute the value of any combinations of dollars (e.g., If you have three ten-dollar bills, one five-dollar bill, and two one-dollar bills, how much money do you have?). d. Relate the value of pennies, nickels, dimes, and quarters to other coins and to the dollar (e.g., There are five nickels in one quarter. There are two nickels in one dime. There are two and a half dimes in one quarter. There are twenty nickels in one dollar). ([1]See glossary Table 1)
MAFS.2.MD.4.9:	Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units.
MAFS.2.MD.4.10:	Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.
MAFS.2.NBT.1.1:	Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. Understand the following as special cases: a. 100 can be thought of as a bundle of ten tens — called a "hundred." b. The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).
MAFS.2.NBT.1.2:	Count within 1000; skip-count by 5s, 10s, and 100s.
MAFS.2.NBT.1.3:	Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.
MAFS.2.NBT.1.4:	Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.
MAFS.2.NBT.2.5:	Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.
MAFS.2.NBT.2.6:	Add up to four two-digit numbers using strategies based on place value and properties of operations.
	Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the

MAFS.2.NBT.2.7:	relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.
MAFS.2.NBT.2.8:	Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900.
MAFS.2.NBT.2.9:	Explain why addition and subtraction strategies work, using place value and the properties of operations.
MAFS.2.OA.1.1:	Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.
MAFS.2.OA.1.a:	Determine the unknown whole number in an equation relating four or more whole numbers. For example, determine the unknown number that makes the equation true in the equations 37 + 10 + 10 = _____ + 18, ? – 6 = 13 – 4, and 15 – 9 = 6 + $\boxed{}$.
MAFS.2.OA.2.2:	Fluently add and subtract within 20 using mental strategies. By end of Grade 2, know from memory all sums of two one-digit numbers.
MAFS.2.OA.3.3:	Determine whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them by 2s; write an equation to express an even number as a sum of two equal addends.
MAFS.2.OA.3.4:	Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.
MAFS.K12.MP.1.1:	**Make sense of problems and persevere in solving them.** Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
MAFS.K12.MP.2.1:	**Reason abstractly and quantitatively**. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
MAFS.K12.MP.3.1:	**Construct viable arguments and critique the reasoning of others.** Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
MAFS.K12.MP.4.1:	**Model with mathematics.** Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
MAFS.K12.MP.5.1:	**Use appropriate tools strategically.** Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
MAFS.K12.MP.6.1:	**Attend to precision.** Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of

	definitions.
MAFS.K12.MP.7.1:	**Look for and make use of structure.** Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 – 3(x – y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
MAFS.K12.MP.8.1:	**Look for and express regularity in repeated reasoning.** Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y – 2)/(x – 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x – 1)(x + 1)$, $(x – 1)(x^2 + x + 1)$, and $(x – 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
LAFS.2.SL.1.1:	Participate in collaborative conversations with diverse partners about grade 2 topics and texts with peers and adults in small and larger groups. a. Follow agreed-upon rules for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the topics and texts under discussion). b. Build on others' talk in conversations by linking their comments to the remarks of others. c. Ask for clarification and further explanation as needed about the topics and texts under discussion.
LAFS.2.SL.1.2:	Recount or describe key ideas or details from a text read aloud or information presented orally or through other media.
LAFS.2.SL.1.3:	Ask and answer questions about what a speaker says in order to clarify comprehension, gather additional information, or deepen understanding of a topic or issue.
LAFS.2.W.1.2:	Write informative/explanatory texts in which they introduce a topic, use facts and definitions to develop points, and provide a concluding statement or section.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

GENERAL NOTES

In Grade 2, instructional time should focus on four critical areas: (1) extending understanding of base-ten notation; (2) building fluency with addition and subtraction; (3) using standard units of measure; and (4) describing and analyzing shapes.

1. Students extend their understanding of the base-ten system. This includes ideas of counting in fives, tens, and multiples of hundreds, tens, and ones, as well as number relationships involving these units, including comparing. Students understand multi-digit numbers (up to 1000) written in base-ten notation, recognizing that the digits in each place represent amounts of thousands, hundreds, tens, or ones (e.g., 853 is 8 hundreds + 5 tens + 3 ones).

2. Students use their understanding of addition to develop fluency with addition and subtraction within 100. They solve problems within 1000 by applying their understanding of models for addition and subtraction, and they develop, discuss, and use efficient, accurate, and generalizable methods to compute sums and differences of whole numbers in base-ten notation, using their understanding of place value and the properties of operations. They select and accurately apply methods that are appropriate for the context and the numbers involved to mentally calculate sums and differences for numbers with only tens or only hundreds.

3. Students recognize the need for standard units of measure (centimeter and inch) and they use rulers and other measurement tools with the understanding that linear measure involves an iteration of units. They recognize that the smaller the unit, the more iterations they need to cover a given length.

4. Students describe and analyze shapes by examining their sides and angles. Students investigate, describe, and reason about decomposing and combining shapes to make other shapes. Through building, drawing, and analyzing two- and three-dimensional shapes, students develop a foundation for understanding area, volume, congruence, similarity, and symmetry in later grades.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:
https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

Florida Standards Implementation Guide Focus Section:

The Mathematics Florida Standards Implementation Guide was created to support the teaching and learning of the Mathematics Florida Standards. The guide is compartmentalized into three components: focus, coherence, and rigor.Focus means narrowing the scope of content in each grade or course, so students achieve higher levels of understanding and experience math concepts more deeply. The Mathematics standards allow for the teaching and learning of mathematical concepts focused around major clusters at each grade level, enhanced by supporting and additional clusters. The major, supporting and additional clusters are identified, in relation to each grade or course. The cluster designations for this course are below.

Major Clusters

MAFS.2.OA.1 Represent and solve problems involving addition and subtraction.

MAFS.2.OA.2 Add and subtract within 20.

MAFS.2.NBT.1 Understand place value.

MAFS.2.NBT.2 Use place value understanding and properties of operations to add and subtract.

MAFS.2.MD.1 Measure and estimate lengths in standard units.

MAFS.2.MD.2 Relate addition and subtraction to length.

Supporting Clusters

MAFS.2.OA.3 Work with equal groups of objects to gain foundations for multiplication.

MAFS.2.MD.3 Work with time and money.

MAFS.2.MD.4 Represent and interpret data.

Additional Clusters

MAFS.2.G.1 Reason with shapes and their attributes.

Note: Clusters should not be sorted from major to supporting and then taught in that order. To do so would strip the coherence of the mathematical ideas and miss the opportunity to enhance the major work of the grade with the supporting and additional clusters.

GENERAL INFORMATION

Course Number: 5012040

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades PreK to 5 Education Courses > **Subject:** Mathematics > **SubSubject:** General Mathematics >

Abbreviated Title: MATH GRADE TWO

Course Length: Year (Y)

Course Attributes:

- Class Size Core Required

Course Type: Core Academic Course

Course Level: 2

Course Status: Course Approved

Grade Level(s): 2

Educator Certifications

Prekindergarten/Primary Education (Age 3 through Grade 3)
Elementary Education (Elementary Grades 1-6)
Primary Education (K-3)
Mathematics (Elementary Grades 1-6)
Elementary Education (Grades K-6)

Grade Two Mathematics (#5012040) 2022 - And Beyond

Course Standards

Name	Description
MA.2.AR.1.1:	Solve one- and two-step addition and subtraction real-world problems. **Clarifications:** *Clarification 1:* Instruction includes understanding the context of the problem, as well as the quantities within the problem. *Clarification 2:* Problems include creating real-world situations based on an equation. *Clarification 3:* Addition and subtraction are limited to sums up to 100 and related differences. Refer to Situations Involving Operations with Numbers (Appendix A).
MA.2.AR.2.1:	Determine and explain whether equations involving addition and subtraction are true or false. **Clarifications:** *Clarification 1:* Instruction focuses on understanding of the equal sign. *Clarification 2:* Problem types are limited to an equation with three or four terms. The sum or difference can be on either side of the equal sign. *Clarification 3:* Addition and subtraction are limited to sums up to 100 and related differences.
MA.2.AR.2.2:	Determine the unknown whole number in an addition or subtraction equation, relating three or four whole numbers, with the unknown in any position. **Clarifications:** *Clarification 1:* Instruction extends the development of algebraic thinking skills where the symbolic representation of the unknown uses any symbol other than a letter. *Clarification 2:* Problems include having the unknown on either side of the equal sign. *Clarification 3:* Addition and subtraction are limited to sums up to 100 and related differences. Refer to Situations Involving Operations with Numbers (Appendix A).
MA.2.AR.3.1:	Represent an even number using two equal groups or two equal addends. Represent an odd number using two equal groups with one left over or two equal addends plus 1. **Clarifications:** *Clarification 1:* Instruction focuses on the connection of recognizing even and odd numbers using skip counting, arrays and patterns in the ones place. *Clarification 2:* Addends are limited to whole numbers less than or equal to 12.
MA.2.AR.3.2:	Use repeated addition to find the total number of objects in a collection of equal groups. Represent the total number of objects using rectangular arrays and equations. **Clarifications:** *Clarification 1:* Instruction includes making a connection between arrays and repeated addition, which builds a foundation for multiplication. *Clarification 2:* The total number of objects is limited to 25.
MA.2.DP.1.1:	Collect, categorize and represent data using tally marks, tables, pictographs or bar graphs. Use appropriate titles, labels and units. **Clarifications:** *Clarification 1:* Data displays can be represented both horizontally and vertically. Scales on graphs are limited to ones, fives or tens.
MA.2.DP.1.2:	Interpret data represented with tally marks, tables, pictographs or bar graphs including solving addition and subtraction problems. **Clarifications:** *Clarification 1:* Addition and subtraction problems are limited to whole numbers with sums within 100 and related differences. *Clarification 2:* Data displays can be represented both horizontally and vertically. Scales on graphs are limited to ones, fives or tens.
MA.2.FR.1.1:	Partition circles and rectangles into two, three or four equal-sized parts. Name the parts using appropriate language, and describe the whole as two halves, three thirds or four fourths. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is not to write the equal-sized parts as a fraction with a numerator and denominator. *Clarification 2:* Problems include mathematical and real-world context.
MA.2.FR.1.2:	Partition rectangles into two, three or four equal-sized parts in two different ways showing that equal-sized parts of the same whole may have different shapes.
MA.2.GR.1.1:	Identify and draw two-dimensional figures based on their defining attributes. Figures are limited to triangles, rectangles, squares, pentagons, hexagons and octagons. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation includes the use of rulers and straight edges.
MA.2.GR.1.2:	Categorize two-dimensional figures based on the number and length of sides, number of vertices, whether they are closed or not and whether the edges are curved or straight. **Clarifications:** *Clarification 1:* Instruction focuses on using formal and informal language to describe defining attributes when categorizing.
	Identify line(s) of symmetry for a two-dimensional figure.

MA.2.GR.1.3:	**Clarifications:** *Clarification 1:* Instruction focuses on the connection between partitioning two-dimensional figures and symmetry. *Clarification 2:* Problem types include being given an image and determining whether a given line is a line of symmetry or not.
MA.2.GR.2.1:	Explore perimeter as an attribute of a figure by placing unit segments along the boundary without gaps or overlaps. Find perimeters of rectangles by counting unit segments. **Clarifications:** *Clarification 1:* Instruction emphasizes the conceptual understanding that perimeter is an attribute that can be measured for a two-dimensional figure. *Clarification 2:* Instruction includes real-world objects, such as picture frames or desktops.
MA.2.GR.2.2:	Find the perimeter of a polygon with whole-number side lengths. Polygons are limited to triangles, rectangles, squares and pentagons. **Clarifications:** *Clarification 1:* Instruction includes the connection to the associative and commutative properties of addition. Refer to Properties of Operations, Equality and Inequality (Appendix D). *Clarification 2:* Within this benchmark, the expectation is not to use a formula to find perimeter. *Clarification 3:* Instruction includes cases where the side lengths are given or measured to the nearest unit. *Clarification 4:* Perimeter cannot exceed 100 units and responses include the appropriate units.
MA.2.M.1.1:	Estimate and measure the length of an object to the nearest inch, foot, yard, centimeter or meter by selecting and using an appropriate tool. **Clarifications:** *Clarification 1:* Instruction includes seeing rulers and tape measures as number lines. *Clarification 2:* Instruction focuses on recognizing that when an object is measured in two different units, fewer of the larger units are required. When comparing measurements of the same object in different units, measurement conversions are not expected. *Clarification 3:* When estimating the size of an object, a comparison with an object of known size can be used.
MA.2.M.1.2:	Measure the lengths of two objects using the same unit and determine the difference between their measurements. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is to measure objects to the nearest inch, foot, yard, centimeter or meter.
MA.2.M.1.3:	Solve one- and two-step real-world measurement problems involving addition and subtraction of lengths given in the same units. **Clarifications:** *Clarification 1:* Addition and subtraction problems are limited to sums within 100 and related differences.
MA.2.M.2.1:	Using analog and digital clocks, tell and write time to the nearest five minutes using a.m. and p.m. appropriately. Express portions of an hour using the fractional terms half an hour, half past, quarter of an hour, quarter after and quarter til. **Clarifications:** *Clarification 1:* Instruction includes the connection to partitioning of circles and to the number line. *Clarification 2:* Within this benchmark, the expectation is not to understand military time.
MA.2.M.2.2:	Solve one- and two-step addition and subtraction real-world problems involving either dollar bills within $100 or coins within 100¢ using $ and ¢ symbols appropriately. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is not to use decimal values. *Clarification 2:* Addition and subtraction problems are limited to sums within 100 and related differences. Refer to Situations Involving Operations with Numbers (Appendix A).
MA.2.NSO.1.1:	Read and write numbers from 0 to 1,000 using standard form, expanded form and word form.
MA.2.NSO.1.2:	Compose and decompose three-digit numbers in multiple ways using hundreds, tens and ones. Demonstrate each composition or decomposition with objects, drawings and expressions or equations.
MA.2.NSO.1.3:	Plot, order and compare whole numbers up to 1,000. **Clarifications:** *Clarification 1:* When comparing numbers, instruction includes using a number line and using place values of the hundreds, tens and ones digits. *Clarification 2:* Within this benchmark, the expectation is to use terms (e.g., less than, greater than, between or equal to) and symbols (<, > or =).
MA.2.NSO.1.4:	Round whole numbers from 0 to 100 to the nearest 10. **Clarifications:** *Clarification 1:* Within the benchmark, the expectation is to understand that rounding is a process that produces a number with a similar value that is less precise but easier to use.
MA.2.NSO.2.1:	Recall addition facts with sums to 20 and related subtraction facts with automaticity.
MA.2.NSO.2.2:	Identify the number that is ten more, ten less, one hundred more and one hundred less than a given three-digit number.
MA.2.NSO.2.3:	Add two whole numbers with sums up to 100 with procedural reliability. Subtract a whole number from a whole number, each no larger than 100, with procedural reliability. **Clarifications:** *Clarification 1:* Instruction focuses on helping a student choose a method they can use reliably.
MA.2.NSO.2.4:	Explore the addition of two whole numbers with sums up to 1,000. Explore the subtraction of a whole number from a whole number, each no larger than 1,000. **Clarifications:** *Clarification 1:* Instruction includes the use of manipulatives, number lines, drawings or properties of operations or place value. *Clarification 2:* Instruction focuses on composing and decomposing ones, tens and hundreds when needed.
	Mathematicians who participate in effortful learning both individually and with others:

MA.K12.MTR.1.1:	• Analyze the problem in a way that makes sense given the task. • Ask questions that will help with solving the task. • Build perseverance by modifying methods as needed while solving a challenging task. • Stay engaged and maintain a positive mindset when working to solve tasks. • Help and support each other when attempting a new method or approach. **Clarifications:** Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: • Build understanding through modeling and using manipulatives. • Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. • Progress from modeling problems with objects and drawings to using algorithms and equations. • Express connections between concepts and representations. • Choose a representation based on the given context or purpose. **Clarifications:** Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations. **Clarifications:** Teachers who encourage students to complete tasks with mathematical fluency: • Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. • Offer multiple opportunities for students to practice efficient and generalizable methods. • Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: • Communicate mathematical ideas, vocabulary and methods effectively. • Analyze the mathematical thinking of others. • Compare the efficiency of a method to those expressed by others. • Recognize errors and suggest how to correctly solve the task. • Justify results by explaining methods and processes. • Construct possible arguments based on evidence. **Clarifications:** Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. **Clarifications:** Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:

MA.K12.MTR.6.1:	• Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. **Clarifications:** Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems. • Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. **Clarifications:** Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. **Clarifications:** K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. **Clarifications:** See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. **Clarifications:** Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. **Clarifications:** In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think _______ because ______." The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. **Clarifications:** Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. **Clarifications:** In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

VERSION DESCRIPTION

The benchmarks in this course are mastery goals that students are expected to attain by the end of the year. To build mastery, students will continue to review and apply earlier grade-level benchmarks and expectations.

GENERAL NOTES

In grade 2, instructional time will emphasize four areas: (1) extending understanding of place value in three-digit numbers; (2) building fluency and algebraic reasoning with addition and subtraction; (3) extending understanding of measurement of objects, time and the perimeter of geometric figures and (4) developing spatial reasoning with number representations and two-dimensional figures.

Curricular content for all subjects must integrate critical-thinking, problem-solving, and workforce-literacy skills; communication, reading, and writing skills; mathematics skills; collaboration skills; contextual and applied-learning skills; technology-literacy skills; information and media-literacy skills; and civic-engagement skills.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:
https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Number: 5012040

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades PreK to 5 Education Courses > **Subject:** Mathematics > **SubSubject:** General Mathematics >

Abbreviated Title: GRADE TWO MATH

Course Length: Year (Y)

Course Type: Core Academic Course

Course Level: 2

Course Status: State Board Approved

Educator Certifications

Prekindergarten/Primary Education (Age 3 through Grade 3)
Elementary Education (Elementary Grades 1-6)
Primary Education (K-3)
Mathematics (Elementary Grades 1-6)
Elementary Education (Grades K-6)

Mathematics - Grade Three (#5012050) 2015 - 2022 (current)

Course Standards

Name	Description
MAFS.3.G.1.1:	Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.
MAFS.3.G.1.2:	Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. *For example, partition a shape into 4 parts with equal area, and describe the area of each part as 1/4 of the area of the shape.*
MAFS.3.MD.1.1:	Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.
MAFS.3.MD.1.2:	Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units. **Clarifications:** **Examples of Opportunities for In-Depth Focus** Continuous measurement quantities such as liquid volume, mass, and so on are an important context for fraction arithmetic (cf. 4.NF.2.4c, 5.NF.2.7c, 5.NF.2.3). In grade 3, students begin to get a feel for continuous measurement quantities and solve whole- number problems involving such quantities.
MAFS.3.MD.2.3:	Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. *For example, draw a bar graph in which each square in the bar graph might represent 5 pets.*
MAFS.3.MD.2.4:	Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters.
MAFS.3.MD.3.5:	Recognize area as an attribute of plane figures and understand concepts of area measurement. a. A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area. b. A plane figure which can be covered without gaps or overlaps by *n* unit squares is said to have an area of *n* square units.
MAFS.3.MD.3.6:	Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).
MAFS.3.MD.3.7:	Relate area to the operations of multiplication and addition. a. Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths. b. Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning. c. Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and b + c is the sum of a × b and a × c. Use area models to represent the distributive property in mathematical reasoning. d. Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems. **Clarifications:** **Examples of Opportunities for In-Depth Focus** Area is a major concept within measurement, and area models must function as a support for multiplicative reasoning in grade 3 and beyond.
MAFS.3.MD.4.8:	Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.
MAFS.3.NBT.1.1:	Use place value understanding to round whole numbers to the nearest 10 or 100.
MAFS.3.NBT.1.2:	Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. **Clarifications:** Students fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. (Although 3.OA.3.7 and 3.NBT.1.2 are both fluency standards, these two standards do not represent equal investments of time in grade 3. Note that students in grade 2 were already adding and subtracting within 1000, just not fluently. That makes 3.NBT.1.2 a relatively small and incremental expectation. By contrast, multiplication and division are new in grade 3, and meeting the multiplication and division fluency standard 3.OA.3.7 with understanding is a major portion of students' work in grade 3.)
MAFS.3.NBT.1.3:	Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9 × 80, 5 × 60) using strategies based on place value and properties of operations.
MAFS.3.NF.1.1:	Understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b.
	Understand a fraction as a number on the number line; represent fractions on a number line diagram. a. Represent a fraction 1/b on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into *b* equal parts. Recognize that each part has size 1/b and that the endpoint of the part based at 0 locates the number 1/b on the number line. b. Represent a fraction *a/b* on a number line diagram by marking off *a* lengths *1/b* from 0. Recognize that the resulting interval has size *a/b* and that its endpoint locates the number *a/b* on the number line. **Clarifications:**

MAFS.3.NF.1.2:	**Example of Opportunities for In-Depth Focus** Developing an understanding of fractions as numbers is essential for future work with the number system. It is critical that students at this grade are able to place fractions on a number line diagram and understand them as a related component of their ever- expanding number system. **Fluency Expectations or Examples of Culminating Standards** Students fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. 3.NBT.1.2 a relatively small and incremental expectation.
MAFS.3.NF.1.3:	Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. a. Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line. b. Recognize and generate simple equivalent fractions, e.g., 1/2 = 2/4, 4/6 = 2/3). Explain why the fractions are equivalent, e.g., by using a visual fraction model. c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. *Examples: Express 3 in the form 3 = 3/1; recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram.* d. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.
MAFS.3.OA.1.1:	Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. *For example, describe a context in which a total number of objects can be expressed as 5 × 7.* **Clarifications:** **Examples of Opportunities for In-Depth Focus** Word problems involving equal groups, arrays, and measurement quantities can be used to build students' understanding of and skill with multiplication and division, as well as to allow students to demonstrate their understanding of and skill with these operations.
MAFS.3.OA.1.2:	Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. *For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.* **Clarifications:** **Examples of Opportunities for In-Depth Focus** Word problems involving equal groups, arrays, and measurement quantities can be used to build students' understanding of and skill with multiplication and division, as well as to allow students to demonstrate their understanding of and skill with these operations.
MAFS.3.OA.1.3:	Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. **Clarifications:** **Examples of Opportunities for In-Depth Focus** Word problems involving equal groups, arrays, and measurement quantities can be used to build students' understanding of and skill with multiplication and division, as well as to allow students to demonstrate their understanding of and skill with these operations.
MAFS.3.OA.1.4:	Determine the unknown whole number in a multiplication or division equation relating three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations* 8 × ? = 48, 5 = [] ÷ 3, 6 × 6 = ?. **Clarifications:** **Examples of Opportunities for In-Depth Focus** Word problems involving equal groups, arrays, and measurement quantities can be used to build students' understanding of and skill with multiplication and division, as well as to allow students to demonstrate their understanding of and skill with these operations.
MAFS.3.OA.2.5:	Apply properties of operations as strategies to multiply and divide. *Examples: If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication.) 3 × 5 × 2 can be found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. (Associative property of multiplication.) Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. (Distributive property.)*
MAFS.3.OA.2.6:	Understand division as an unknown-factor problem. *For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8.*
MAFS.3.OA.3.7:	Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers. **Clarifications:** **Fluency Expectations or Examples of Culminating Standards** Students fluently multiply and divide within 100. By the end of grade 3, they know all products of two one-digit numbers from memory. Multiplication and division are new in grade 3, and meeting the multiplication and division fluency standard 3.OA.3.7 with understanding is a major portion of students' work in grade 3. **Examples of Opportunities for In-Depth Focus** Finding single-digit products and related quotients is a required fluency for grade 3. Reaching fluency will take much of the year for many students. These skills and the understandings that support them are crucial; students will rely on them for years to come as they learn to multiply and divide with multidigit whole numbers and to add, subtract, multiply, and divide with fractions. After multiplication and division situations have been established, reasoning about patterns in products (e.g., products involving factors of 5 or 9) can help students remember particular products and quotients. Practice — and if necessary, extra support — should continue all year for those who need it to attain fluency.
MAFS.3.OA.4.8:	Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.
MAFS.3.OA.4.9:	Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. *For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.*

MAFS.K12.MP.1.1:	**Make sense of problems and persevere in solving them.** Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
MAFS.K12.MP.2.1:	**Reason abstractly and quantitatively**. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
MAFS.K12.MP.3.1:	**Construct viable arguments and critique the reasoning of others.** Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
MAFS.K12.MP.4.1:	**Model with mathematics.** Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
MAFS.K12.MP.5.1:	**Use appropriate tools strategically.** Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
MAFS.K12.MP.6.1:	**Attend to precision.** Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
MAFS.K12.MP.7.1:	**Look for and make use of structure.** Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
MAFS.K12.MP.8.1:	**Look for and express regularity in repeated reasoning.** Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$,

	$(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
LAFS.3.SL.1.1:	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 3 *topics and texts*, building on others' ideas and expressing their own clearly. a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion. b. Follow agreed-upon rules for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the topics and texts under discussion). c. Ask questions to check understanding of information presented, stay on topic, and link their comments to the remarks of others. d. Explain their own ideas and understanding in light of the discussion.
LAFS.3.SL.1.2:	Determine the main ideas and supporting details of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.
LAFS.3.SL.1.3:	Ask and answer questions about information from a speaker, offering appropriate elaboration and detail.
LAFS.3.W.1.2:	Write informative/explanatory texts to examine a topic and convey ideas and information clearly. a. Introduce a topic and group related information together; include illustrations when useful to aiding comprehension. b. Develop the topic with facts, definitions, and details. c. Use linking words and phrases (e.g., also, another, and, more, but) to connect ideas within categories of information. d. Provide a concluding statement or section.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

GENERAL NOTES

MAFS.3

In Grade 3, instructional time should focus on four critical areas: (1) developing understanding of multiplication and division and strategies for multiplication and division within 100; (2) developing understanding of fractions, especially unit fractions (fractions with numerator 1); (3) developing understanding of the structure of rectangular arrays and of area; and (4) describing and analyzing two-dimensional shapes.

(1) Students develop an understanding of the meanings of multiplication and division of whole numbers through activities and problems involving equal-sized groups, arrays, and area models; multiplication is finding an unknown product, and division is finding an unknown factor in these situations. For equal-sized group situations, division can require finding the unknown number of groups or the unknown group size. Students use properties of operations to calculate products of whole numbers, using increasingly sophisticated strategies based on these properties to solve multiplication and division problems involving single-digit factors. By comparing a variety of solution strategies, students learn the relationship between multiplication and division.

(2) Students develop an understanding of fractions, beginning with unit fractions. Students view fractions in general as being built out of unit fractions, and they use fractions along with visual fraction models to represent parts of a whole. Students understand that the size of a fractional part is relative to the size of the whole. For example, 1/2 of the paint in a small bucket could be less paint than 1/3 of the paint in a larger bucket, but 1/3 of a ribbon is longer than 1/5 of the same ribbon because when the ribbon is divided into 3 equal parts, the parts are longer than when the ribbon is divided into 5 equal parts. Students are able to use fractions to represent numbers equal to, less than, and greater than one. They solve problems that involve comparing fractions by using visual fraction models and strategies based on noticing equal numerators or denominators.

(3) Students recognize area as an attribute of two-dimensional regions. They measure the area of a shape by finding the total number of same-size units of area required to cover the shape without gaps or overlaps, a square with sides of unit length being the standard unit for measuring area. Students understand that rectangular arrays can be decomposed into identical rows or into identical columns. By decomposing rectangles into rectangular arrays of squares, students connect area to multiplication, and justify using multiplication to determine the area of a rectangle.

(4) Students describe, analyze, and compare properties of two-dimensional shapes. They compare and classify shapes by their sides and angles, and connect these with definitions of shapes. Students also relate their fraction work to geometry by expressing the area of part of a shape as a unit fraction of the whole.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:
https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

Florida Standards Implementation Guide Focus Section:

The Mathematics Florida Standards Implementation Guide was created to support the teaching and learning of the Mathematics Florida Standards. The guide is compartmentalized into three components: focus, coherence, and rigor.Focus means narrowing the scope of content in each grade or course, so students achieve higher levels of understanding and experience math concepts more deeply. The Mathematics standards allow for the teaching and learning of mathematical concepts focused around major clusters at each grade level, enhanced by supporting and additional clusters. The major, supporting and additional clusters are identified, in relation to each grade or course. The cluster designations for this course are below.

Major Clusters

MAFS.3.OA.1 Represent and solve problems involving multiplication and division.

MAFS.3.OA.2 Understand properties of multiplication and the relationship between multiplication and division.

MAFS.3.OA.3 Multiply and divide within 100.

MAFS.3.OA.4 Solve problems involving the four operations, and identify and explain patterns in arithmetic.

MAFS.3.NF.1 Develop understanding of fractions as numbers.

MAFS.3.MD.1 Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.

MAFS.3.MD.3 Geometric measurement: understand concepts of area and relate area to multiplication and to addition.

Supporting Clusters

MAFS.3.MD.2 Represent and interpret data.

MAFS.3.G.1 Reason with shapes and their attributes.

Additional Clusters

MAFS.3.NBT.1 Use place value understanding and properties of operations to perform multi-digit arithmetic.

MAFS.3.MD.4 Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.

Note: Clusters should not be sorted from major to supporting and then taught in that order. To do so would strip the coherence of the mathematical ideas and miss the opportunity to enhance the major work of the grade with the supporting and additional clusters.

GENERAL INFORMATION

Course Number: 5012050

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades PreK to 5 Education Courses > **Subject:** Mathematics > **SubSubject:** General Mathematics >

Abbreviated Title: MATH GRADE THREE

Course Length: Year (Y)

Course Attributes:

- Class Size Core Required

Course Type: Core Academic Course

Course Level: 2

Course Status: Course Approved

Grade Level(s): 3

Educator Certifications

Prekindergarten/Primary Education (Age 3 through Grade 3)
Elementary Education (Elementary Grades 1-6)
Primary Education (K-3)
Mathematics (Elementary Grades 1-6)
Elementary Education (Grades K-6)

Grade Three Mathematics (#5012050) 2022 - And Beyond

Course Standards

Name	Description
MA.3.AR.1.1:	Apply the distributive property to multiply a one-digit number and two-digit number. Apply properties of multiplication to find a product of one-digit whole numbers. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is to apply the associative and commutative properties of multiplication, the distributive property and name the properties. Refer to K-12 Glossary (Appendix C). *Clarification 2:* Within the benchmark, the expectation is to utilize parentheses. *Clarification 3:* Multiplication for products of three or more numbers is limited to factors within 12. Refer to Properties of Operations, Equality and Inequality (Appendix D).
MA.3.AR.1.2:	Solve one- and two-step real-world problems involving any of four operations with whole numbers. **Clarifications:** *Clarification 1:* Instruction includes understanding the context of the problem, as well as the quantities within the problem. *Clarification 2:* Multiplication is limited to factors within 12 and related division facts. Refer to Situations Involving Operations with Numbers (Appendix A).
MA.3.AR.2.1:	Restate a division problem as a missing factor problem using the relationship between multiplication and division. **Clarifications:** *Clarification 1:* Multiplication is limited to factors within 12 and related division facts. *Clarification 2:* Within this benchmark, the symbolic representation of the missing factor uses any symbol or a letter.
MA.3.AR.2.2:	Determine and explain whether an equation involving multiplication or division is true or false. **Clarifications:** *Clarification 1:* Instruction extends the understanding of the meaning of the equal sign to multiplication and division. *Clarification 2:* Problem types are limited to an equation with three or four terms. The product or quotient can be on either side of the equal sign. *Clarification 3:* Multiplication is limited to factors within 12 and related division facts.
MA.3.AR.2.3:	Determine the unknown whole number in a multiplication or division equation, relating three whole numbers, with the unknown in any position. **Clarifications:** *Clarification 1:* Instruction extends the development of algebraic thinking skills where the symbolic representation of the unknown uses any symbol or a letter. *Clarification 2:* Problems include the unknown on either side of the equal sign. *Clarification 3:* Multiplication is limited to factors within 12 and related division facts. Refer to Situations Involving Operations with Numbers (Appendix A).
MA.3.AR.3.1:	Determine and explain whether a whole number from 1 to 1,000 is even or odd. **Clarifications:** *Clarification 1:* Instruction includes determining and explaining using place value and recognizing patterns.
MA.3.AR.3.2:	Determine whether a whole number from 1 to 144 is a multiple of a given one-digit number. **Clarifications:** *Clarification 1:* Instruction includes determining if a number is a multiple of a given number by using multiplication or division.
MA.3.AR.3.3:	Identify, create and extend numerical patterns. **Clarifications:** *Clarification 1:* The expectation is to use ordinal numbers (1st, 2nd, 3rd, ...) to describe the position of a number within a sequence. *Clarification 2:* Problem types include patterns involving addition, subtraction, multiplication or division of whole numbers.
MA.3.DP.1.1:	Collect and represent numerical and categorical data with whole-number values using tables, scaled pictographs, scaled bar graphs or line plots. Use appropriate titles, labels and units. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is to complete a representation or construct a representation from a data set. *Clarification 2:* Instruction includes the connection between multiplication and the number of data points represented by a bar in scaled bar graph or a scaled column in a pictograph. *Clarification 3:* Data displays are represented both horizontally and vertically.
MA.3.DP.1.2:	Interpret data with whole-number values represented with tables, scaled pictographs, circle graphs, scaled bar graphs or line plots by solving one- and two-step problems. **Clarifications:** *Clarification 1:* Problems include the use of data in informal comparisons between two data sets in the same units. *Clarification 2:* Data displays can be represented both horizontally and vertically. *Clarification 3:* Circle graphs are limited to showing the total values in each category.

MA.3.FR.1.1:	Represent and interpret unit fractions in the form 1/n as the quantity formed by one part when a whole is partitioned into n equal parts. **Clarifications:** *Clarification 1:* This benchmark emphasizes conceptual understanding through the use of manipulatives or visual models. *Clarification 2:* Instruction focuses on representing a unit fraction as part of a whole, part of a set, a point on a number line, a visual model or in fractional notation. *Clarification 3:* Denominators are limited to 2, 3, 4, 5, 6, 8, 10 and 12.
MA.3.FR.1.2:	Represent and interpret fractions, including fractions greater than one, in the form of $\frac{m}{n}$ as the result of adding the unit fraction $\frac{1}{n}$ to itself m times. **Clarifications:** *Clarification 1:* Instruction emphasizes conceptual understanding through the use of manipulatives or visual models, including circle graphs, to represent fractions. *Clarification 2:* Denominators are limited to 2, 3, 4, 5, 6, 8, 10 and 12.
MA.3.FR.1.3:	Read and write fractions, including fractions greater than one, using standard form, numeral-word form and word form. **Clarifications:** *Clarification 1:* Instruction focuses on making connections to reading and writing numbers to develop the understanding that fractions are numbers and to support algebraic thinking in later grades. *Clarification 2:* Denominators are limited to 2, 3, 4, 5, 6, 8, 10 and 12.
MA.3.FR.2.1:	Plot, order and compare fractional numbers with the same numerator or the same denominator. **Clarifications:** *Clarification 1:* Instruction includes making connections between using a ruler and plotting and ordering fractions on a number line. *Clarification 2:* When comparing fractions, instruction includes an appropriately scaled number line and using reasoning about their size. *Clarification 3:* Fractions include fractions greater than one, including mixed numbers, with denominators limited to 2, 3, 4, 5, 6, 8, 10 and 12.
MA.3.FR.2.2:	Identify equivalent fractions and explain why they are equivalent. **Clarifications:** *Clarification 1:* Instruction includes identifying equivalent fractions and explaining why they are equivalent using manipulatives, drawings, and number lines. *Clarification 2:* Within this benchmark, the expectation is not to generate equivalent fractions. *Clarification 3:* Fractions are limited to fractions less than or equal to one with denominators of 2, 3, 4, 5, 6, 8, 10 and 12. Number lines must be given and scaled appropriately.
MA.3.GR.1.1:	Describe and draw points, lines, line segments, rays, intersecting lines, perpendicular lines and parallel lines. Identify these in two-dimensional figures. **Clarifications:** *Clarification 1:* Instruction includes mathematical and real-world context for identifying points, lines, line segments, rays, intersecting lines, perpendicular lines and parallel lines. *Clarification 2:* When working with perpendicular lines, right angles can be called square angles or square corners.
MA.3.GR.1.2:	Identify and draw quadrilaterals based on their defining attributes. Quadrilaterals include parallelograms, rhombi, rectangles, squares and trapezoids. **Clarifications:** *Clarification 1:* Instruction includes a variety of quadrilaterals and a variety of non-examples that lack one or more defining attributes when identifying quadrilaterals. *Clarification 2:* Quadrilaterals will be filled, outlined or both when identifying. *Clarification 3:* Drawing representations must be reasonably accurate.
MA.3.GR.1.3:	Draw line(s) of symmetry in a two-dimensional figure and identify line-symmetric two-dimensional figures. **Clarifications:** *Clarification 1:* Instruction develops the understanding that there could be no line of symmetry, exactly one line of symmetry or more than one line of symmetry. *Clarification 2:* Instruction includes folding paper along a line of symmetry so that both halves match exactly to confirm line-symmetric figures.
MA.3.GR.2.1:	Explore area as an attribute of a two-dimensional figure by covering the figure with unit squares without gaps or overlaps. Find areas of rectangles by counting unit squares. **Clarifications:** *Clarification 1:* Instruction emphasizes the conceptual understanding that area is an attribute that can be measured for a two-dimensional figure. The measurement unit for area is the area of a unit square, which is a square with side length of 1 unit. *Clarification 2:* Two-dimensional figures cannot exceed 12 units by 12 units and responses include the appropriate units in word form (e.g., square centimeter or sq.cm.).
MA.3.GR.2.2:	Find the area of a rectangle with whole-number side lengths using a visual model and a multiplication formula. **Clarifications:** *Clarification 1:* Instruction includes covering the figure with unit squares, a rectangular array or applying a formula. *Clarification 2:* Two-dimensional figures cannot exceed 12 units by 12 units and responses include the appropriate units in word form.
MA.3.GR.2.3:	Solve mathematical and real-world problems involving the perimeter and area of rectangles with whole-number side lengths using a visual model and a formula. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is not to find unknown side lengths.

	Clarification 2: Two-dimensional figures cannot exceed 12 units by 12 units and responses include the appropriate units in word form.
MA.3.GR.2.4:	Solve mathematical and real-world problems involving the perimeter and area of composite figures composed of non-overlapping rectangles with whole-number side lengths. **Clarifications:** *Clarification 1:* Composite figures must be composed of non-overlapping rectangles. *Clarification 2:* Each rectangle within the composite figure cannot exceed 12 units by 12 units and responses include the appropriate units in word form.
MA.3.M.1.1:	Select and use appropriate tools to measure the length of an object, the volume of liquid within a beaker and temperature. **Clarifications:** *Clarification 1:* Instruction focuses on identifying measurement on a linear scale, making the connection to the number line. *Clarification 2:* When measuring the length, limited to the nearest centimeter and half or quarter inch. *Clarification 3:* When measuring the temperature, limited to the nearest degree. *Clarification 4:* When measuring the volume of liquid, limited to nearest milliliter and half or quarter cup.
MA.3.M.1.2:	Solve real-world problems involving any of the four operations with whole-number lengths, masses, weights, temperatures or liquid volumes. **Clarifications:** *Clarification 1:* Within this benchmark, it is the expectation that responses include appropriate units. *Clarification 2:* Problem types are not expected to include measurement conversions. *Clarification 3:* Instruction includes the comparison of attributes measured in the same units. *Clarification 4:* Units are limited to yards, feet, inches; meters, centimeters; pounds, ounces; kilograms, grams; degrees Fahrenheit, degrees Celsius; gallons, quarts, pints, cups; and liters, milliliters.
MA.3.M.2.1:	Using analog and digital clocks tell and write time to the nearest minute using a.m. and p.m. appropriately. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is not to understand military time.
MA.3.M.2.2:	Solve one- and two-step real-world problems involving elapsed time. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is not to include crossing between a.m. and p.m.
MA.3.NSO.1.1:	Read and write numbers from 0 to 10,000 using standard form, expanded form and word form.
MA.3.NSO.1.2:	Compose and decompose four-digit numbers in multiple ways using thousands, hundreds, tens and ones. Demonstrate each composition or decomposition using objects, drawings and expressions or equations.
MA.3.NSO.1.3:	Plot, order and compare whole numbers up to 10,000. **Clarifications:** *Clarification 1:* When comparing numbers, instruction includes using an appropriately scaled number line and using place values of the thousands, hundreds, tens and ones digits. *Clarification 2:* Number lines, scaled by 50s, 100s or 1,000s, must be provided and can be a representation of any range of numbers. *Clarification 3:* Within this benchmark, the expectation is to use symbols (<, > or =).
MA.3.NSO.1.4:	Round whole numbers from 0 to 1,000 to the nearest 10 or 100.
MA.3.NSO.2.1:	Add and subtract multi-digit whole numbers including using a standard algorithm with procedural fluency.
MA.3.NSO.2.2:	Explore multiplication of two whole numbers with products from 0 to 144, and related division facts. **Clarifications:** *Clarification 1:* Instruction includes equal groups, arrays, area models and equations. *Clarification 2:* Within the benchmark, it is the expectation that one problem can be represented in multiple ways and understanding how the different representations are related to each other. *Clarification 3:* Factors and divisors are limited to up to 12.
MA.3.NSO.2.3:	Multiply a one-digit whole number by a multiple of 10, up to 90, or a multiple of 100, up to 900, with procedural reliability. **Clarifications:** *Clarification 1:* When multiplying one-digit numbers by multiples of 10 or 100, instruction focuses on methods that are based on place value.
MA.3.NSO.2.4:	Multiply two whole numbers from 0 to 12 and divide using related facts with procedural reliability. **Clarifications:** *Clarification 1:* Instruction focuses on helping a student choose a method they can use reliably.
MA.K12.MTR.1.1:	Mathematicians who participate in effortful learning both individually and with others: • Analyze the problem in a way that makes sense given the task. • Ask questions that will help with solving the task. • Build perseverance by modifying methods as needed while solving a challenging task. • Stay engaged and maintain a positive mindset when working to solve tasks. • Help and support each other when attempting a new method or approach. **Clarifications:** Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.

MA.K12.MTR.2.1:	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: • Build understanding through modeling and using manipulatives. • Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. • Progress from modeling problems with objects and drawings to using algorithms and equations. • Express connections between concepts and representations. • Choose a representation based on the given context or purpose. **Clarifications:** Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations. **Clarifications:** Teachers who encourage students to complete tasks with mathematical fluency: • Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. • Offer multiple opportunities for students to practice efficient and generalizable methods. • Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: • Communicate mathematical ideas, vocabulary and methods effectively. • Analyze the mathematical thinking of others. • Compare the efficiency of a method to those expressed by others. • Recognize errors and suggest how to correctly solve the task. • Justify results by explaining methods and processes. • Construct possible arguments based on evidence. **Clarifications:** Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. **Clarifications:** Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. **Clarifications:** Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.

MA.K12.MTR.7.1:	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems. • Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. **Clarifications:** Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. **Clarifications:** K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. **Clarifications:** See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. **Clarifications:** Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. **Clarifications:** In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think _______ because ______." The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. **Clarifications:** Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. **Clarifications:** In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

VERSION DESCRIPTION

The benchmarks in this course are mastery goals that students are expected to attain by the end of the year. To build mastery, students will continue to review and apply earlier grade-level benchmarks and expectations.

GENERAL NOTES

In grade 3, instructional time will emphasize four areas: (1) adding and subtracting multi-digit whole numbers, including using a standard algorithm; (2) building an understanding of multiplication and division, the relationship between them and the connection to area of rectangles; (3) developing an understanding of fractions and (4) extending geometric reasoning to lines and attributes of quadrilaterals.

Curricular content for all subjects must integrate critical-thinking, problem-solving, and workforce-literacy skills; communication, reading, and writing skills; mathematics skills; collaboration skills; contextual and applied-learning skills; technology-literacy skills; information and media-literacy skills; and civic-engagement skills.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:
https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Number: 5012050

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades PreK to 5 Education Courses > **Subject:** Mathematics > **SubSubject:** General Mathematics >

Abbreviated Title: GRADE THREE MATH

Course Length: Year (Y)

Course Type: Core Academic Course

Course Level: 2

Course Status: State Board Approved

Educator Certifications

Prekindergarten/Primary Education (Age 3 through Grade 3)
Elementary Education (Elementary Grades 1-6)
Primary Education (K-3)
Mathematics (Elementary Grades 1-6)
Elementary Education (Grades K-6)

Accelerated Mathematics Plan Grade Three (#5012055) 2019 - 2022 (current)

Course Standards

Name	Description
MAFS.3.G.1.1:	Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.
MAFS.3.G.1.2:	Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. *For example, partition a shape into 4 parts with equal area, and describe the area of each part as 1/4 of the area of the shape.*
MAFS.3.MD.1.1:	Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.
MAFS.3.MD.1.2:	Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units. **Clarifications:** **Examples of Opportunities for In-Depth Focus** Continuous measurement quantities such as liquid volume, mass, and so on are an important context for fraction arithmetic (cf. 4.NF.2.4c, 5.NF.2.7c, 5.NF.2.3). In grade 3, students begin to get a feel for continuous measurement quantities and solve whole- number problems involving such quantities.
MAFS.3.MD.2.3:	Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs. *For example, draw a bar graph in which each square in the bar graph might represent 5 pets.*
MAFS.3.MD.2.4:	Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters.
MAFS.3.MD.3.5:	Recognize area as an attribute of plane figures and understand concepts of area measurement. a. A square with side length 1 unit, called “a unit square,” is said to have “one square unit” of area, and can be used to measure area. b. A plane figure which can be covered without gaps or overlaps by *n* unit squares is said to have an area of *n* square units.
MAFS.3.MD.3.6:	Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).
MAFS.3.MD.3.7:	Relate area to the operations of multiplication and addition. a. Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths. b. Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning. c. Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and b + c is the sum of a × b and a × c. Use area models to represent the distributive property in mathematical reasoning. d. Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems. **Clarifications:** **Examples of Opportunities for In-Depth Focus** Area is a major concept within measurement, and area models must function as a support for multiplicative reasoning in grade 3 and beyond.
MAFS.3.MD.4.8:	Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.
MAFS.3.NBT.1.1:	Use place value understanding to round whole numbers to the nearest 10 or 100.
MAFS.3.NBT.1.2:	Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. **Clarifications:** Students fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. (Although 3.OA.3.7 and 3.NBT.1.2 are both fluency standards, these two standards do not represent equal investments of time in grade 3. Note that students in grade 2 were already adding and subtracting within 1000, just not fluently. That makes 3.NBT.1.2 a relatively small and incremental expectation. By contrast, multiplication and division are new in grade 3, and meeting the multiplication and division fluency standard 3.OA.3.7 with understanding is a major portion of students’ work in grade 3.)
MAFS.3.NBT.1.3:	Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9 × 80, 5 × 60) using strategies based on place value and properties of operations.
MAFS.3.NF.1.1:	Understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b.
	Understand a fraction as a number on the number line; represent fractions on a number line diagram. a. Represent a fraction 1/b on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into *b* equal parts. Recognize that each part has size 1/b and that the endpoint of the part based at 0 locates the number 1/b on the number line.

MAFS.3.NF.1.2:	b. Represent a fraction *a/b* on a number line diagram by marking off *a* lengths *1/b* from 0. Recognize that the resulting interval has size *a/b* and that its endpoint locates the number *a/b* on the number line. **Clarifications:** **Example of Opportunities for In-Depth Focus** Developing an understanding of fractions as numbers is essential for future work with the number system. It is critical that students at this grade are able to place fractions on a number line diagram and understand them as a related component of their ever- expanding number system. **Fluency Expectations or Examples of Culminating Standards** Students fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. 3.NBT.1.2 a relatively small and incremental expectation.
MAFS.3.NF.1.3:	Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. a. Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line. b. Recognize and generate simple equivalent fractions, e.g., 1/2 = 2/4, 4/6 = 2/3). Explain why the fractions are equivalent, e.g., by using a visual fraction model. c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. *Examples: Express 3 in the form 3 = 3/1; recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram.* d. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.
MAFS.3.OA.1.1:	Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. *For example, describe a context in which a total number of objects can be expressed as 5 × 7.* **Clarifications:** **Examples of Opportunities for In-Depth Focus** Word problems involving equal groups, arrays, and measurement quantities can be used to build students' understanding of and skill with multiplication and division, as well as to allow students to demonstrate their understanding of and skill with these operations.
MAFS.3.OA.1.2:	Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. *For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.* **Clarifications:** **Examples of Opportunities for In-Depth Focus** Word problems involving equal groups, arrays, and measurement quantities can be used to build students' understanding of and skill with multiplication and division, as well as to allow students to demonstrate their understanding of and skill with these operations.
MAFS.3.OA.1.3:	Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. **Clarifications:** **Examples of Opportunities for In-Depth Focus** Word problems involving equal groups, arrays, and measurement quantities can be used to build students' understanding of and skill with multiplication and division, as well as to allow students to demonstrate their understanding of and skill with these operations.
MAFS.3.OA.1.4:	Determine the unknown whole number in a multiplication or division equation relating three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations* 8 × ? = 48, 5 = [] ÷ 3, 6 × 6 = ?. **Clarifications:** **Examples of Opportunities for In-Depth Focus** Word problems involving equal groups, arrays, and measurement quantities can be used to build students' understanding of and skill with multiplication and division, as well as to allow students to demonstrate their understanding of and skill with these operations.
MAFS.3.OA.2.5:	Apply properties of operations as strategies to multiply and divide. *Examples: If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication.) 3 × 5 × 2 can be found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. (Associative property of multiplication.) Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. (Distributive property.)*
MAFS.3.OA.2.6:	Understand division as an unknown-factor problem. *For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8.*
MAFS.3.OA.3.7:	Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers. **Clarifications:** **Fluency Expectations or Examples of Culminating Standards** Students fluently multiply and divide within 100. By the end of grade 3, they know all products of two one-digit numbers from memory. Multiplication and division are new in grade 3, and meeting the multiplication and division fluency standard 3.OA.3.7 with understanding is a major portion of students' work in grade 3. **Examples of Opportunities for In-Depth Focus** Finding single-digit products and related quotients is a required fluency for grade 3. Reaching fluency will take much of the year for many students. These skills and the understandings that support them are crucial; students will rely on them for years to come as they learn to multiply and divide with multidigit whole numbers and to add, subtract, multiply, and divide with fractions. After multiplication and division situations have been established, reasoning about patterns in products (e.g., products involving factors of 5 or 9) can help students remember particular products and quotients. Practice — and if necessary, extra support — should continue all year for those who need it to attain fluency.

MAFS.3.OA.4.8:	Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.
MAFS.3.OA.4.9:	Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. *For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.*
MAFS.4.G.1.1:	Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.
MAFS.4.G.1.2:	Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.
MAFS.4.MD.1.1:	Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. *For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...*
MAFS.4.MD.1.3:	Apply the area and perimeter formulas for rectangles in real world and mathematical problems. *For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.*
MAFS.4.MD.3.5:	Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement: a. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a “one-degree angle,” and can be used to measure angles. b. An angle that turns through *n* one-degree angles is said to have an angle measure of *n* degrees.
MAFS.4.MD.3.6:	Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.
MAFS.4.MD.3.7:	Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.
MAFS.4.NBT.1.2:	Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.
MAFS.4.NBT.1.3:	Use place value understanding to round multi-digit whole numbers to any place.
MAFS.4.NBT.2.4:	Fluently add and subtract multi-digit whole numbers using the standard algorithm. **Clarifications:** **Fluency Expectations or Examples of Culminating Standards** Students’ work with decimals (4.NF.3.5–3.7) depends to some extent on concepts of fraction
MAFS.4.NBT.2.5:	Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. **Clarifications:** **Examples of Opportunities for In-Depth Focus** When students work toward meeting this standard, they combine prior understanding of multiplication with deepening understanding of the base-ten system of units to express the product of two multi-digit numbers as another multi-digit number. This work will continue in grade 5 and culminate in fluency with the standard algorithms in grade 6.
MAFS.4.NF.1.1:	Explain why a fraction *a*/b is equivalent to a fraction (n × a)/(n × b) by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions. **Clarifications:** **Examples of Opportunities for In-Depth Focus** Extending fraction equivalence to the general case is necessary to extend arithmetic from whole numbers to fractions and decimals.
MAFS.4.NF.1.2:	Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.
MAFS.4.OA.1.1:	Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.
MAFS.4.OA.1.2:	Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.
MAFS.4.OA.1.3:	Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.
MAFS.4.OA.2.4:	Investigate factors and multiples. a. Find all factor pairs for a whole number in the range 1–100. b. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. c. Determine whether a given whole number in the range 1–100 is prime or composite.
MAFS.K12.MP.1.1:	**Make sense of problems and persevere in solving them.** Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on

	using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
MAFS.K12.MP.2.1:	**Reason abstractly and quantitatively**. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
MAFS.K12.MP.3.1:	**Construct viable arguments and critique the reasoning of others.** Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
MAFS.K12.MP.4.1:	**Model with mathematics.** Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
MAFS.K12.MP.5.1:	**Use appropriate tools strategically.** Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
MAFS.K12.MP.6.1:	**Attend to precision.** Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
MAFS.K12.MP.7.1:	**Look for and make use of structure.** Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
MAFS.K12.MP.8.1:	**Look for and express regularity in repeated reasoning.** Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
LAFS.3.SL.1.1:	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 3 *topics and texts*, building on others' ideas and expressing their own clearly. a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion. b. Follow agreed-upon rules for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the

	topics and texts under discussion). c. Ask questions to check understanding of information presented, stay on topic, and link their comments to the remarks of others. d. Explain their own ideas and understanding in light of the discussion.
LAFS.3.SL.1.2:	Determine the main ideas and supporting details of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.
LAFS.3.SL.1.3:	Ask and answer questions about information from a speaker, offering appropriate elaboration and detail.
LAFS.3.W.1.2:	Write informative/explanatory texts to examine a topic and convey ideas and information clearly. a. Introduce a topic and group related information together; include illustrations when useful to aiding comprehension. b. Develop the topic with facts, definitions, and details. c. Use linking words and phrases (e.g., also, another, and, more, but) to connect ideas within categories of information. d. Provide a concluding statement or section.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

VERSION DESCRIPTION

In this course, instructional time should focus on five critical areas: (1) developing understanding of multiplication and division and strategies for multiplication and division within 100; (2) using place value to develop an understanding and fluency with multi-digit multiplication; (3) developing understanding of fractions, especially unit fractions (fractions with numerator 1); (4) developing understanding of the structure of rectangular arrays and of area; and (5) describing, analyzing, and classifying two-dimensional shapes.

(1) Students develop an understanding of the meanings of multiplication and division of whole numbers through activities and problems involving equal-sized groups, arrays, and area models; multiplication is finding an unknown product, and division is finding an unknown factor in these situations. For equal-sized group situations, division can require finding the unknown number of groups or the unknown group size. Students use properties of operations to calculate products of whole numbers, using increasingly sophisticated strategies based on these properties to solve multiplication and division problems involving single-digit factors. By comparing a variety of solution strategies, students learn the relationship between multiplication and division.

(2) Students generalize their understanding of place values to 1,000,000, understanding the relative sizes of numbers in each place. They apply their understanding of models for multiplication (equal-sized groups, arrays, area models), place value, and properties of operations, in particular the distributive property, as they develop, discuss, and use efficient, accurate, and generalization methods to compute products of multi-digit whole numbers. Depending on the numbers and the context, they select and accurately apply appropriate methods to estimate or mentally calculate products. They develop fluency with efficient procedures for multiplying whole numbers; understand and explain why the procedures work based on place value and properties of operations; and use them to solve problems.

(3) Students develop an understanding of fractions, beginning with unit fractions. Students view fractions in general as being built out of unit fractions, and they use fractions along with visual fraction models to represent parts of a whole. Students understand that the size of a fractional part is relative to the size of the whole. For example, 1/2 of the paint in a small bucket could be less paint than 1/3 of the paint in a larger bucket, but 1/3 of a ribbon is longer than 1/5 of the same ribbon because when the ribbon is divided into 3 equal parts, the parts are longer than when the ribbon is divided into 5 equal parts. Students are able to use fractions to represent numbers equal to, less than, and greater than one. They solve problems that involve comparing fractions by using visual fraction models and strategies based on noticing equal numerators or denominators. Students develop understanding of fraction equivalence and operations with fractions. They recognize that two different fractions can be equal (e.g., 15/9 = 5/3), and they develop methods for generating and recognizing equivalent fractions

(4) Students recognize area as an attribute of two-dimensional regions. They measure the area of a shape by finding the total number of same-size units of area required to cover the shape without gaps or overlaps, a square with sides of unit length being the standard unit for measuring area. Students understand that rectangular arrays can be decomposed into identical rows or into identical columns. By decomposing rectangles into rectangular arrays of squares, students connect area to multiplication, and justify using multiplication to determine the area of a rectangle.

(5) Students describe, analyze, and compare properties of two-dimensional shapes. They compare and classify shapes by their sides and angles, and connect these with definitions of shapes. Students also relate their fraction work to geometry by expressing the area of part of a shape as a unit fraction of the whole. Students describe, analyze, compare, and classify two-dimensional shapes based on their properties, such as having parallel sides, perpendicular sides, particular angle measures, and symmetry.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: {{AzureStorageLink}}/uploads/docs/standards/eld/ma.pdf

For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

GENERAL INFORMATION

Course Number: 5012055

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades PreK to 5 Education Courses > **Subject:** Mathematics > **SubSubject:** General Mathematics >

Abbreviated Title: ACCEL MATH GRADE 3

Course Length: Year (Y)

Course Attributes:

- Honors
- Class Size Core Required

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 3

Educator Certifications

Elementary Education (Grades K-6)
Elementary Education (Elementary Grades 1-6)
Mathematics (Elementary Grades 1-6)

Course Standards

Name	Description
MA.3.AR.1.1:	Apply the distributive property to multiply a one-digit number and two-digit number. Apply properties of multiplication to find a product of one-digit whole numbers. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is to apply the associative and commutative properties of multiplication, the distributive property and name the properties. Refer to K-12 Glossary (Appendix C). *Clarification 2:* Within the benchmark, the expectation is to utilize parentheses. *Clarification 3:* Multiplication for products of three or more numbers is limited to factors within 12. Refer to Properties of Operations, Equality and Inequality (Appendix D).
MA.3.AR.1.2:	Solve one- and two-step real-world problems involving any of four operations with whole numbers. **Clarifications:** *Clarification 1:* Instruction includes understanding the context of the problem, as well as the quantities within the problem. *Clarification 2:* Multiplication is limited to factors within 12 and related division facts. Refer to Situations Involving Operations with Numbers (Appendix A).
MA.3.AR.2.1:	Restate a division problem as a missing factor problem using the relationship between multiplication and division. **Clarifications:** *Clarification 1:* Multiplication is limited to factors within 12 and related division facts. *Clarification 2:* Within this benchmark, the symbolic representation of the missing factor uses any symbol or a letter.
MA.3.AR.2.2:	Determine and explain whether an equation involving multiplication or division is true or false. **Clarifications:** *Clarification 1:* Instruction extends the understanding of the meaning of the equal sign to multiplication and division. *Clarification 2:* Problem types are limited to an equation with three or four terms. The product or quotient can be on either side of the equal sign. *Clarification 3:* Multiplication is limited to factors within 12 and related division facts.
MA.3.AR.2.3:	Determine the unknown whole number in a multiplication or division equation, relating three whole numbers, with the unknown in any position. **Clarifications:** *Clarification 1:* Instruction extends the development of algebraic thinking skills where the symbolic representation of the unknown uses any symbol or a letter. *Clarification 2:* Problems include the unknown on either side of the equal sign. *Clarification 3:* Multiplication is limited to factors within 12 and related division facts. Refer to Situations Involving Operations with Numbers (Appendix A).
MA.3.AR.3.1:	Determine and explain whether a whole number from 1 to 1,000 is even or odd. **Clarifications:** *Clarification 1:* Instruction includes determining and explaining using place value and recognizing patterns.
MA.3.AR.3.2:	Determine whether a whole number from 1 to 144 is a multiple of a given one-digit number. **Clarifications:** *Clarification 1:* Instruction includes determining if a number is a multiple of a given number by using multiplication or division.
MA.3.AR.3.3:	Identify, create and extend numerical patterns. **Clarifications:** *Clarification 1:* The expectation is to use ordinal numbers (1st, 2nd, 3rd, ...) to describe the position of a number within a sequence. *Clarification 2:* Problem types include patterns involving addition, subtraction, multiplication or division of whole numbers.
MA.3.DP.1.1:	Collect and represent numerical and categorical data with whole-number values using tables, scaled pictographs, scaled bar graphs or line plots. Use appropriate titles, labels and units. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is to complete a representation or construct a representation from a data set. *Clarification 2:* Instruction includes the connection between multiplication and the number of data points represented by a bar in scaled bar graph or a scaled column in a pictograph. *Clarification 3:* Data displays are represented both horizontally and vertically.
MA.3.DP.1.2:	Interpret data with whole-number values represented with tables, scaled pictographs, circle graphs, scaled bar graphs or line plots by solving one- and two-step problems. **Clarifications:** *Clarification 1:* Problems include the use of data in informal comparisons between two data sets in the same units. *Clarification 2:* Data displays can be represented both horizontally and vertically.

	Clarification 3: Circle graphs are limited to showing the total values in each category.
MA.3.FR.1.1:	Represent and interpret unit fractions in the form 1/n as the quantity formed by one part when a whole is partitioned into n equal parts. **Clarifications:** *Clarification 1:* This benchmark emphasizes conceptual understanding through the use of manipulatives or visual models. *Clarification 2:* Instruction focuses on representing a unit fraction as part of a whole, part of a set, a point on a number line, a visual model or in fractional notation. *Clarification 3:* Denominators are limited to 2, 3, 4, 5, 6, 8, 10 and 12.
MA.3.FR.1.2:	Represent and interpret fractions, including fractions greater than one, in the form of $\frac{m}{n}$ as the result of adding the unit fraction $\frac{1}{n}$ to itself m times. **Clarifications:** *Clarification 1:* Instruction emphasizes conceptual understanding through the use of manipulatives or visual models, including circle graphs, to represent fractions. *Clarification 2:* Denominators are limited to 2, 3, 4, 5, 6, 8, 10 and 12.
MA.3.FR.1.3:	Read and write fractions, including fractions greater than one, using standard form, numeral-word form and word form. **Clarifications:** *Clarification 1:* Instruction focuses on making connections to reading and writing numbers to develop the understanding that fractions are numbers and to support algebraic thinking in later grades. *Clarification 2:* Denominators are limited to 2, 3, 4, 5, 6, 8, 10 and 12.
MA.3.FR.2.1:	Plot, order and compare fractional numbers with the same numerator or the same denominator. **Clarifications:** *Clarification 1:* Instruction includes making connections between using a ruler and plotting and ordering fractions on a number line. *Clarification 2:* When comparing fractions, instruction includes an appropriately scaled number line and using reasoning about their size. *Clarification 3:* Fractions include fractions greater than one, including mixed numbers, with denominators limited to 2, 3, 4, 5, 6, 8, 10 and 12.
MA.3.FR.2.2:	Identify equivalent fractions and explain why they are equivalent. **Clarifications:** *Clarification 1:* Instruction includes identifying equivalent fractions and explaining why they are equivalent using manipulatives, drawings, and number lines. *Clarification 2:* Within this benchmark, the expectation is not to generate equivalent fractions. *Clarification 3:* Fractions are limited to fractions less than or equal to one with denominators of 2, 3, 4, 5, 6, 8, 10 and 12. Number lines must be given and scaled appropriately.
MA.3.GR.1.1:	Describe and draw points, lines, line segments, rays, intersecting lines, perpendicular lines and parallel lines. Identify these in two-dimensional figures. **Clarifications:** *Clarification 1:* Instruction includes mathematical and real-world context for identifying points, lines, line segments, rays, intersecting lines, perpendicular lines and parallel lines. *Clarification 2:* When working with perpendicular lines, right angles can be called square angles or square corners.
MA.3.GR.1.2:	Identify and draw quadrilaterals based on their defining attributes. Quadrilaterals include parallelograms, rhombi, rectangles, squares and trapezoids. **Clarifications:** *Clarification 1:* Instruction includes a variety of quadrilaterals and a variety of non-examples that lack one or more defining attributes when identifying quadrilaterals. *Clarification 2:* Quadrilaterals will be filled, outlined or both when identifying. *Clarification 3:* Drawing representations must be reasonably accurate.
MA.3.GR.1.3:	Draw line(s) of symmetry in a two-dimensional figure and identify line-symmetric two-dimensional figures. **Clarifications:** *Clarification 1:* Instruction develops the understanding that there could be no line of symmetry, exactly one line of symmetry or more than one line of symmetry. *Clarification 2:* Instruction includes folding paper along a line of symmetry so that both halves match exactly to confirm line-symmetric figures.
MA.3.GR.2.1:	Explore area as an attribute of a two-dimensional figure by covering the figure with unit squares without gaps or overlaps. Find areas of rectangles by counting unit squares. **Clarifications:** *Clarification 1:* Instruction emphasizes the conceptual understanding that area is an attribute that can be measured for a two-dimensional figure. The measurement unit for area is the area of a unit square, which is a square with side length of 1 unit. *Clarification 2:* Two-dimensional figures cannot exceed 12 units by 12 units and responses include the appropriate units in word form (e.g., square centimeter or sq.cm.).
MA.3.GR.2.2:	Find the area of a rectangle with whole-number side lengths using a visual model and a multiplication formula. **Clarifications:** *Clarification 1:* Instruction includes covering the figure with unit squares, a rectangular array or applying a formula. *Clarification 2:* Two-dimensional figures cannot exceed 12 units by 12 units and responses include the appropriate units in word form.
	Solve mathematical and real-world problems involving the perimeter and area of rectangles with whole-number side lengths using a visual model and a formula.

MA.3.GR.2.3:	**Clarifications:** *Clarification 1:* Within this benchmark, the expectation is not to find unknown side lengths. *Clarification 2:* Two-dimensional figures cannot exceed 12 units by 12 units and responses include the appropriate units in word form.
MA.3.GR.2.4:	Solve mathematical and real-world problems involving the perimeter and area of composite figures composed of non-overlapping rectangles with whole-number side lengths. **Clarifications:** *Clarification 1:* Composite figures must be composed of non-overlapping rectangles. *Clarification 2:* Each rectangle within the composite figure cannot exceed 12 units by 12 units and responses include the appropriate units in word form.
MA.3.M.1.1:	Select and use appropriate tools to measure the length of an object, the volume of liquid within a beaker and temperature. **Clarifications:** *Clarification 1:* Instruction focuses on identifying measurement on a linear scale, making the connection to the number line. *Clarification 2:* When measuring the length, limited to the nearest centimeter and half or quarter inch. *Clarification 3:* When measuring the temperature, limited to the nearest degree. *Clarification 4:* When measuring the volume of liquid, limited to nearest milliliter and half or quarter cup.
MA.3.M.1.2:	Solve real-world problems involving any of the four operations with whole-number lengths, masses, weights, temperatures or liquid volumes. **Clarifications:** *Clarification 1:* Within this benchmark, it is the expectation that responses include appropriate units. *Clarification 2:* Problem types are not expected to include measurement conversions. *Clarification 3:* Instruction includes the comparison of attributes measured in the same units. *Clarification 4:* Units are limited to yards, feet, inches; meters, centimeters; pounds, ounces; kilograms, grams; degrees Fahrenheit, degrees Celsius; gallons, quarts, pints, cups; and liters, milliliters.
MA.3.M.2.1:	Using analog and digital clocks tell and write time to the nearest minute using a.m. and p.m. appropriately. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is not to understand military time.
MA.3.M.2.2:	Solve one- and two-step real-world problems involving elapsed time. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is not to include crossing between a.m. and p.m.
MA.3.NSO.1.1:	Read and write numbers from 0 to 10,000 using standard form, expanded form and word form.
MA.3.NSO.1.2:	Compose and decompose four-digit numbers in multiple ways using thousands, hundreds, tens and ones. Demonstrate each composition or decomposition using objects, drawings and expressions or equations.
MA.3.NSO.1.3:	Plot, order and compare whole numbers up to 10,000. **Clarifications:** *Clarification 1:* When comparing numbers, instruction includes using an appropriately scaled number line and using place values of the thousands, hundreds, tens and ones digits. *Clarification 2:* Number lines, scaled by 50s, 100s or 1,000s, must be provided and can be a representation of any range of numbers. *Clarification 3:* Within this benchmark, the expectation is to use symbols (<, > or =).
MA.3.NSO.1.4:	Round whole numbers from 0 to 1,000 to the nearest 10 or 100.
MA.3.NSO.2.1:	Add and subtract multi-digit whole numbers including using a standard algorithm with procedural fluency.
MA.3.NSO.2.2:	Explore multiplication of two whole numbers with products from 0 to 144, and related division facts. **Clarifications:** *Clarification 1:* Instruction includes equal groups, arrays, area models and equations. *Clarification 2:* Within the benchmark, it is the expectation that one problem can be represented in multiple ways and understanding how the different representations are related to each other. *Clarification 3:* Factors and divisors are limited to up to 12.
MA.3.NSO.2.3:	Multiply a one-digit whole number by a multiple of 10, up to 90, or a multiple of 100, up to 900, with procedural reliability. **Clarifications:** *Clarification 1:* When multiplying one-digit numbers by multiples of 10 or 100, instruction focuses on methods that are based on place value.
MA.3.NSO.2.4:	Multiply two whole numbers from 0 to 12 and divide using related facts with procedural reliability. **Clarifications:** *Clarification 1:* Instruction focuses on helping a student choose a method they can use reliably.
MA.4.AR.1.2:	Solve real-world problems involving addition and subtraction of fractions with like denominators, including mixed numbers and fractions greater than one. **Clarifications:** *Clarification 1:* Problems include creating real-world situations based on an equation or representing a real-world problem with a visual model or equation. *Clarification 2:* Fractions within problems must reference the same whole. *Clarification 3:* Within this benchmark, the expectation is not to simplify or use lowest terms. *Clarification 4:* Denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, 16 and 100.
	Determine and explain whether an equation involving any of the four operations with whole numbers is true or false.

MA.4.AR.2.1:	**Clarifications:** *Clarification 1:* Multiplication is limited to whole number factors within 12 and related division facts.
MA.4.AR.2.2:	Given a mathematical or real-world context, write an equation involving multiplication or division to determine the unknown whole number with the unknown in any position. **Clarifications:** *Clarification 1:* Instruction extends the development of algebraic thinking skills where the symbolic representation of the unknown uses a letter. *Clarification 2:* Problems include the unknown on either side of the equal sign. *Clarification 3:* Multiplication is limited to factors within 12 and related division facts.
MA.4.AR.3.1:	Determine factor pairs for a whole number from 0 to 144. Determine whether a whole number from 0 to 144 is prime, composite or neither. **Clarifications:** *Clarification 1:* Instruction includes the connection to the relationship between multiplication and division and patterns with divisibility rules. *Clarification 2:* The numbers 0 and 1 are neither prime nor composite.
MA.4.AR.3.2:	Generate, describe and extend a numerical pattern that follows a given rule. **Clarifications:** *Clarification 1:* Instruction includes patterns within a mathematical or real-world context.
MA.4.FR.1.1:	Model and express a fraction, including mixed numbers and fractions greater than one, with the denominator 10 as an equivalent fraction with the denominator 100. **Clarifications:** *Clarification 1:* Instruction emphasizes conceptual understanding through the use of manipulatives, visual models, number lines or equations.
MA.4.FR.1.3:	Identify and generate equivalent fractions, including fractions greater than one. Describe how the numerator and denominator are affected when the equivalent fraction is created. **Clarifications:** *Clarification 1:* Instruction includes the use of manipulatives, visual models, number lines or equations. *Clarification 2:* Instruction includes recognizing how the numerator and denominator are affected when equivalent fractions are generated.
MA.4.FR.1.4:	Plot, order and compare fractions, including mixed numbers and fractions greater than one, with different numerators and different denominators. **Clarifications:** *Clarification 1:* When comparing fractions, instruction includes using an appropriately scaled number line and using reasoning about their size. *Clarification 2:* Instruction includes using benchmark quantities, such as 0, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ and 1, to compare fractions. *Clarification 3:* Denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, 16 and 100. *Clarification 4:* Within this benchmark, the expectation is to use symbols (<, > or =).
MA.4.FR.2.1:	Decompose a fraction, including mixed numbers and fractions greater than one, into a sum of fractions with the same denominator in multiple ways. Demonstrate each decomposition with objects, drawings and equations. **Clarifications:** *Clarification 1:* Denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, 16 and 100.
MA.4.FR.2.2:	Add and subtract fractions with like denominators, including mixed numbers and fractions greater than one, with procedural reliability. **Clarifications:** *Clarification 1:* Instruction includes the use of word form, manipulatives, drawings, the properties of operations or number lines. *Clarification 2:* Within this benchmark, the expectation is not to simplify or use lowest terms. *Clarification 3:* Denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, 16 and 100.
MA.4.FR.2.3:	Explore the addition of a fraction with denominator of 10 to a fraction with denominator of 100 using equivalent fractions. **Clarifications:** *Clarification 1:* Instruction includes the use of visual models. *Clarification 2:* Within this benchmark, the expectation is not to simplify or use lowest terms.
MA.4.GR.1.1:	Informally explore angles as an attribute of two-dimensional figures. Identify and classify angles as acute, right, obtuse, straight or reflex. **Clarifications:** *Clarification 1:* Instruction includes classifying angles using benchmark angles of 90° and 180° in two-dimensional figures. *Clarification 2:* When identifying angles, the expectation includes two-dimensional figures and real-world pictures.
MA.4.GR.1.2:	Estimate angle measures. Using a protractor, measure angles in whole-number degrees and draw angles of specified measure in whole-number degrees. Demonstrate that angle measure is additive. **Clarifications:** *Clarification 1:* Instruction includes measuring given angles and drawing angles using protractors. *Clarification 2:* Instruction includes estimating angle measures using benchmark angles (30°, 45°, 60°, 90° and 180°). *Clarification 3:* Instruction focuses on the understanding that angles can be decomposed into non-overlapping angles whose measures sum to the measure of the original angle.
MA.4.GR.1.3:	Solve real-world and mathematical problems involving unknown whole-number angle measures. Write an equation to represent the unknown. **Clarifications:** *Clarification 1:* Instruction includes the connection to angle measure as being additive.
	Solve perimeter and area mathematical and real-world problems, including problems with unknown sides, for rectangles with whole-number side lengths.

MA.4.GR.2.1:	**Clarifications:** *Clarification 1:* Instruction extends the development of algebraic thinking where the symbolic representation of the unknown uses a letter. *Clarification 2:* Problems involving multiplication are limited to products of up to 3 digits by 2 digits. Problems involving division are limited to up to 4 digits divided by 1 digit. *Clarification 3:* Responses include the appropriate units in word form.
MA.4.GR.2.2:	Solve problems involving rectangles with the same perimeter and different areas or with the same area and different perimeters. **Clarifications:** *Clarification 1:* Instruction focuses on the conceptual understanding of the relationship between perimeter and area. *Clarification 2:* Within this benchmark, rectangles are limited to having whole-number side lengths. *Clarification 3:* Problems involving multiplication are limited to products of up to 3 digits by 2 digits. Problems involving division are limited to up to 4 digits divided by 1 digit. *Clarification 4:* Responses include the appropriate units in word form.
MA.4.NSO.1.2:	Read and write multi-digit whole numbers from 0 to 1,000,000 using standard form, expanded form and word form.
MA.4.NSO.1.3:	Plot, order and compare multi-digit whole numbers up to 1,000,000. **Clarifications:** *Clarification 1:* When comparing numbers, instruction includes using an appropriately scaled number line and using place values of the hundred thousands, ten thousands, thousands, hundreds, tens and ones digits. *Clarification 2:* Scaled number lines must be provided and can be a representation of any range of numbers. *Clarification 3:* Within this benchmark, the expectation is to use symbols (<, > or =).
MA.4.NSO.1.4:	Round whole numbers from 0 to 10,000 to the nearest 10, 100 or 1,000.
MA.4.NSO.2.1:	Recall multiplication facts with factors up to 12 and related division facts with automaticity.
MA.4.NSO.2.2:	Multiply two whole numbers, up to three digits by up to two digits, with procedural reliability. **Clarifications:** *Clarification 1:* Instruction focuses on helping a student choose a method they can use reliably. *Clarification 2:* Instruction includes the use of models or equations based on place value and the distributive property.
MA.4.NSO.2.5:	Explore the multiplication and division of multi-digit whole numbers using estimation, rounding and place value. **Clarifications:** *Clarification 1:* Instruction focuses on previous understanding of multiplication with multiples of 10 and 100, and seeing division as a missing factor problem. *Clarification 2:* Estimating quotients builds the foundation for division using a standard algorithm. *Clarification 3:* When estimating the division of whole numbers, dividends are limited to up to four digits and divisors are limited to up to two digits.
MA.K12.MTR.1.1:	Mathematicians who participate in effortful learning both individually and with others: • Analyze the problem in a way that makes sense given the task. • Ask questions that will help with solving the task. • Build perseverance by modifying methods as needed while solving a challenging task. • Stay engaged and maintain a positive mindset when working to solve tasks. • Help and support each other when attempting a new method or approach. **Clarifications:** Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students’ ability to analyze and problem solve. • Recognize students’ effort when solving challenging problems.
MA.K12.MTR.2.1:	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: • Build understanding through modeling and using manipulatives. • Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. • Progress from modeling problems with objects and drawings to using algorithms and equations. • Express connections between concepts and representations. • Choose a representation based on the given context or purpose. **Clarifications:** Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.
	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence.

MA.K12.MTR.3.1:	• Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations. **Clarifications:** Teachers who encourage students to complete tasks with mathematical fluency: • Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. • Offer multiple opportunities for students to practice efficient and generalizable methods. • Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: • Communicate mathematical ideas, vocabulary and methods effectively. • Analyze the mathematical thinking of others. • Compare the efficiency of a method to those expressed by others. • Recognize errors and suggest how to correctly solve the task. • Justify results by explaining methods and processes. • Construct possible arguments based on evidence. **Clarifications:** Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. **Clarifications:** Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. **Clarifications:** Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems. • Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. **Clarifications:** Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning. **Clarifications:** K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.

ELA.K12.EE.1.1:	4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. **Clarifications:** See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. **Clarifications:** Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. **Clarifications:** In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think _______ because ______." The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. **Clarifications:** Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. **Clarifications:** In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

General Course Information and Notes

VERSION DESCRIPTION

In grade 3 accelerated, instructional time will emphasize five areas: (1) extending understanding of place value in multi-digit whole numbers; (2) adding and subtracting multi-digit whole numbers, including using a standard algorithm; (3) building an understanding of multiplication and division, the relationship between them and the connection to area of rectangles; (4) developing an understanding of fractions and (5) extending geometric reasoning to lines, angles and attributes of quadrilaterals.

Curricular content for all subjects must integrate critical-thinking, problem-solving, and workforce-literacy skills; communication, reading, and writing skills; mathematics skills; collaboration skills; contextual and applied-learning skills; technology-literacy skills; information and media-literacy skills; and civic-engagement skills.

GENERAL NOTES

Honors and Accelerated Level Course Note: Accelerated courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Path: Section: Grades PreK to 12 Education

Course Number: 5012055

Courses > **Grade Group:** Grades PreK to 5 Education Courses > **Subject:** Mathematics > **SubSubject:** General Mathematics >

Abbreviated Title: GR 3 ACCEL MATH

Course Length: Year (Y)

Course Attributes:

- Class Size Core Required

Course Type: Core Academic Course

Course Level: 3

Course Status: State Board Approved

Educator Certifications

Elementary Education (Grades K-6)
Elementary Education (Elementary Grades 1-6)
Mathematics (Elementary Grades 1-6)

Mathematics - Grade Four (#5012060) 2015 - 2022 (current)

Course Standards

Name	Description
MAFS.4.G.1.1:	Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.
MAFS.4.G.1.2:	Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.
MAFS.4.G.1.3:	Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.
MAFS.4.MD.1.1:	Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. *For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...*
MAFS.4.MD.1.2:	Use the four operations to solve word problems[1] involving distances, intervals of time, and money, including problems involving simple fractions or decimals[2]. Represent fractional quantities of distance and intervals of time using linear models. ([1]See glossary Table 1 and Table 2) ([2]Computational fluency with fractions and decimals is not the goal for students at this grade level.)
MAFS.4.MD.1.3:	Apply the area and perimeter formulas for rectangles in real world and mathematical problems. *For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.*
MAFS.4.MD.2.4:	Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. *For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.*
MAFS.4.MD.3.5:	Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement: a. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a “one-degree angle,” and can be used to measure angles. b. An angle that turns through *n* one-degree angles is said to have an angle measure of *n* degrees.
MAFS.4.MD.3.6:	Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.
MAFS.4.MD.3.7:	Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.
MAFS.4.NBT.1.1:	Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. *For example, recognize that 700 ÷ 70 = 10 by applying concepts of place value and division.*
MAFS.4.NBT.1.2:	Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.
MAFS.4.NBT.1.3:	Use place value understanding to round multi-digit whole numbers to any place.
MAFS.4.NBT.2.4:	Fluently add and subtract multi-digit whole numbers using the standard algorithm. **Clarifications:** **Fluency Expectations or Examples of Culminating Standards** Students’ work with decimals (4.NF.3.5–3.7) depends to some extent on concepts of fraction
MAFS.4.NBT.2.5:	Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. **Clarifications:** **Examples of Opportunities for In-Depth Focus** When students work toward meeting this standard, they combine prior understanding of multiplication with deepening understanding of the base-ten system of units to express the product of two multi-digit numbers as another multi-digit number. This work will continue in grade 5 and culminate in fluency with the standard algorithms in grade 6.
MAFS.4.NBT.2.6:	Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. **Clarifications:** **Examples of Opportunities for In-Depth Focus** When students work toward meeting this standard, they combine prior understanding of multiplication and division with deepening understanding of the base-ten system of units to find whole-number quotients and remainders with up to four-digit dividends and one- digit divisors. This work will develop further in grade 5 and culminate in fluency with the standard algorithms in grade 6.
MAFS.4.NF.1.1:	Explain why a fraction a/b is equivalent to a fraction (n × a)/(n × b) by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions. **Clarifications:** **Examples of Opportunities for In-Depth Focus** Extending fraction equivalence to the general case is necessary to extend arithmetic from whole numbers to fractions and decimals.

MAFS.4.NF.1.2:	Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.
MAFS.4.NF.2.3:	Understand a fraction a/b with a > 1 as a sum of fractions 1/b. a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. b. Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. *Examples: 3/8 = 1/8 + 1/8 + 1/8 ; 3/8 = 1/8 + 2/8 ; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8.* c. Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction. d. Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem. **Clarifications:** **Examples of Opportunities for In-Depth Focus** This standard represents an important step in the multi-grade progression for addition and subtraction of fractions. Students extend their prior understanding of addition and subtraction to add and subtract fractions with like denominators by thinking of adding or subtracting so many unit fractions.
MAFS.4.NF.2.4:	Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. a. Understand a fraction a/b as a multiple of 1/b. *For example, use a visual fraction model to represent 5/4 as the product 5 × (1/4), recording the conclusion by the equation 5/4 = 5 × (1/4).* b. Understand a multiple of a/b as a multiple of 1/b, and use this understanding to multiply a fraction by a whole number. *For example, use a visual fraction model to express 3 × (2/5) as 6 × (1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.)* c. Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. *For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?* **Clarifications:** **Examples of Opportunities for In-Depth Focus** This standard represents an important step in the multi-grade progression for multiplication and division of fractions. Students extend their developing understanding of multiplication to multiply a fraction by a whole number.
MAFS.4.NF.3.5:	Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. *For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100.*
MAFS.4.NF.3.6:	Use decimal notation for fractions with denominators 10 or 100. *For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram.*
MAFS.4.NF.3.7:	Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model.
MAFS.4.OA.1.1:	Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.
MAFS.4.OA.1.2:	Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.
MAFS.4.OA.1.3:	Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.
MAFS.4.OA.1.a:	Determine whether an equation is true or false by using comparative relational thinking. *For example, without adding 60 and 24, determine whether the equation 60 + 24 = 57 + 27 is true or false.*
MAFS.4.OA.1.b:	Determine the unknown whole number in an equation relating four whole numbers using comparative relational thinking. *For example, solve 76 + 9 = n + 5 for n by arguing that nine is four more than five, so the unknown number must be four greater than 76.*
MAFS.4.OA.2.4:	Investigate factors and multiples. a. Find all factor pairs for a whole number in the range 1–100. b. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. c. Determine whether a given whole number in the range 1–100 is prime or composite.
MAFS.4.OA.3.5:	Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. *For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.*
MAFS.K12.MP.1.1:	**Make sense of problems and persevere in solving them.** Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.

MAFS.K12.MP.2.1:	**Reason abstractly and quantitatively**. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
MAFS.K12.MP.3.1:	**Construct viable arguments and critique the reasoning of others.** Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
MAFS.K12.MP.4.1:	**Model with mathematics.** Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
MAFS.K12.MP.5.1:	**Use appropriate tools strategically.** Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
MAFS.K12.MP.6.1:	**Attend to precision.** Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
MAFS.K12.MP.7.1:	**Look for and make use of structure.** Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
MAFS.K12.MP.8.1:	**Look for and express regularity in repeated reasoning.** Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
LAFS.4.SL.1.1:	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade *4 topics and texts*, building on others' ideas and expressing their own clearly. a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion. b. Follow agreed-upon rules for discussions and carry out assigned roles. c. Pose and respond to specific questions to clarify or follow up on information, and make comments that contribute to the discussion and link to the remarks of others. d. Review the key ideas expressed and explain their own ideas and understanding in light of the discussion.

LAFS.4.SL.1.2:	Paraphrase portions of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.
LAFS.4.SL.1.3:	Identify the reasons and evidence a speaker provides to support particular points.
LAFS.4.W.1.2:	Write informative/explanatory texts to examine a topic and convey ideas and information clearly. a. Introduce a topic clearly and group related information in paragraphs and sections; include formatting (e.g., headings), illustrations, and multimedia when useful to aiding comprehension. b. Develop the topic with facts, definitions, concrete details, quotations, or other information and examples related to the topic. c. Link ideas within categories of information using words and phrases (e.g., *another, for example, also, because*). d. Use precise language and domain-specific vocabulary to inform about or explain the topic. e. Provide a concluding statement or section related to the information or explanation presented.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

GENERAL NOTES

MAFS.4

In Grade 4, instructional time should focus on three critical areas: (1) developing understanding and fluency with multi-digit multiplication, and developing understanding of dividing to find quotients involving multi-digit dividends; (2) developing an understanding of fraction equivalence, addition and subtraction of fractions with like denominators, and multiplication of fractions by whole numbers; (3) understanding that geometric figures can be analyzed and classified based on their properties, such as having parallel sides, perpendicular sides, particular angle measures, and symmetry.

(1) Students generalize their understanding of place value to 1,000,000, understanding the relative sizes of numbers in each place. They apply their understanding of models for multiplication (equal-sized groups, arrays, area models), place value, and properties of operations, in particular the distributive property, as they develop, discuss, and use efficient, accurate, and generalization methods to compute products of multi-digit whole numbers. Depending on the numbers and the context, they select and accurately apply appropriate methods to estimate or mentally calculate products. They develop fluency with efficient procedures for multiplying whole numbers; understand and explain why the procedures work based on place value and properties of operations; and use them to solve problems. Students apply their understanding of models for division, place value, properties of operations, and the relationship of division to multiplication as they develop, discuss, and use efficient, accurate, and generalization procedures to find quotients involving multi-digit dividends. They select and accurately apply appropriate methods to estimate and mentally calculate quotients, and interpret remainders based upon the context.

(2) Students develop understanding of fraction equivalence and operations with fractions. They recognize that two different fractions can be equal (e.g., 15/9 = 5/3), and they develop methods for generating and recognizing equivalent fractions. Students extend previous understandings about how fractions are built from unit fractions, composing fractions from unit fractions, decomposing fractions into unit fractions, and using the meaning of fractions and the meaning of multiplication to multiply a fraction by a whole number.

(3) Students describe, analyze, compare, and classify two-dimensional shapes. Through building, drawing, and analyzing two-dimensional shapes, students deepen their understanding of properties of two-dimensional objects and the use of them to solve problems involving symmetry.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:
https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

Florida Standards Implementation Guide Focus Section:

The Mathematics Florida Standards Implementation Guide was created to support the teaching and learning of the Mathematics Florida Standards. The guide is compartmentalized into three components: focus, coherence, and rigor.Focus means narrowing the scope of content in each grade or course, so students achieve higher levels of understanding and experience math concepts more deeply. The Mathematics standards allow for the teaching and learning of mathematical concepts focused around major clusters at each grade level, enhanced by supporting and additional clusters. The major, supporting and additional clusters are identified, in relation to each grade or course. The cluster designations for this course are below.

Major Clusters

MAFS.4.OA.1 Use the four operations with whole numbers to solve problems.

MAFS.4.NBT.1 Generalize place value understanding for multi-digit whole numbers.

MAFS.4.NBT.2 Use place value understanding and properties of operations to perform multi-digit arithmetic.

MAFS.4.NF.1 Extend understanding of fraction equivalence and ordering.

MAFS.4.NF.2 Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.

MAFS.4.NF.3 Understand decimal notation for fractions, and compare decimal fractions.

Supporting Clusters

MAFS.4.OA.2 Gain familiarity with factors and multiples.

MAFS.4.MD.1 Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.

MAFS.4.MD.2 Represent and interpret data.

Additional Clusters

MAFS.4.OA.3 Generate and analyze patterns.

MAFS.4.MD.3 Geometric measurement: understand concepts of angle and measure angles.

MAFS.4.G.1 Draw and identify lines and angles, and classify shapes by properties of their lines and angles.

Note: Clusters should not be sorted from major to supporting and then taught in that order. To do so would strip the coherence of the mathematical ideas and miss the opportunity to enhance the major work of the grade with the supporting and additional clusters.

GENERAL INFORMATION

Course Number: 5012060

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades PreK to 5 Education Courses > **Subject:** Mathematics > **SubSubject:** General Mathematics >

Abbreviated Title: MATH GRADE FOUR

Course Length: Year (Y)

Course Attributes:

- Class Size Core Required

Course Type: Core Academic Course

Course Level: 2

Course Status: Course Approved

Grade Level(s): 4

Educator Certifications

Elementary Education (Elementary Grades 1-6)
Mathematics (Elementary Grades 1-6)
Elementary Education (Grades K-6)

Grade Four Mathematics (#5012060) 2022 - And Beyond

Course Standards

Name	Description
MA.4.AR.1.1:	Solve real-world problems involving multiplication and division of whole numbers including problems in which remainders must be interpreted within the context. **Clarifications:** *Clarification 1:* Problems involving multiplication include multiplicative comparisons. Refer to Situations Involving Operations with Numbers (Appendix A). *Clarification 2:* Depending on the context, the solution of a division problem with a remainder may be the whole number part of the quotient, the whole number part of the quotient with the remainder, the whole number part of the quotient plus 1, or the remainder. *Clarification 3:* Multiplication is limited to products of up to 3 digits by 2 digits. Division is limited to up to 4 digits divided by 1 digit.
MA.4.AR.1.2:	Solve real-world problems involving addition and subtraction of fractions with like denominators, including mixed numbers and fractions greater than one. **Clarifications:** *Clarification 1:* Problems include creating real-world situations based on an equation or representing a real-world problem with a visual model or equation. *Clarification 2:* Fractions within problems must reference the same whole. *Clarification 3:* Within this benchmark, the expectation is not to simplify or use lowest terms. *Clarification 4:* Denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, 16 and 100.
MA.4.AR.1.3:	Solve real-world problems involving multiplication of a fraction by a whole number or a whole number by a fraction. **Clarifications:** *Clarification 1:* Problems include creating real-world situations based on an equation or representing a real-world problem with a visual model or equation. *Clarification 2:* Fractions within problems must reference the same whole. *Clarification 3:* Within this benchmark, the expectation is not to simplify or use lowest terms. *Clarification 4:* Fractions limited to fractions less than one with denominators of 2, 3, 4, 5, 6, 8, 10, 12, 16 and 100.
MA.4.AR.2.1:	Determine and explain whether an equation involving any of the four operations with whole numbers is true or false. **Clarifications:** *Clarification 1:* Multiplication is limited to whole number factors within 12 and related division facts.
MA.4.AR.2.2:	Given a mathematical or real-world context, write an equation involving multiplication or division to determine the unknown whole number with the unknown in any position. **Clarifications:** *Clarification 1:* Instruction extends the development of algebraic thinking skills where the symbolic representation of the unknown uses a letter. *Clarification 2:* Problems include the unknown on either side of the equal sign. *Clarification 3:* Multiplication is limited to factors within 12 and related division facts.
MA.4.AR.3.1:	Determine factor pairs for a whole number from 0 to 144. Determine whether a whole number from 0 to 144 is prime, composite or neither. **Clarifications:** *Clarification 1:* Instruction includes the connection to the relationship between multiplication and division and patterns with divisibility rules. *Clarification 2:* The numbers 0 and 1 are neither prime nor composite.
MA.4.AR.3.2:	Generate, describe and extend a numerical pattern that follows a given rule. **Clarifications:** *Clarification 1:* Instruction includes patterns within a mathematical or real-world context.
MA.4.DP.1.1:	Collect and represent numerical data, including fractional values, using tables, stem-and-leaf plots or line plots. **Clarifications:** *Clarification 1:* Denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, 16 and 100.
MA.4.DP.1.2:	Determine the mode, median or range to interpret numerical data including fractional values, represented with tables, stem-and-leaf plots or line plots. **Clarifications:** *Clarification 1:* Instruction includes interpreting data within a real-world context. *Clarification 2:* Instruction includes recognizing that data sets can have one mode, no mode or more than one mode. *Clarification 3:* Within this benchmark, data sets are limited to an odd number when calculating the median. *Clarification 4:* Denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, 16 and 100.
	Solve real-world problems involving numerical data.

MA.4.DP.1.3:	**Clarifications:** *Clarification 1:* Instruction includes using any of the four operations to solve problems. *Clarification 2:* Data involving fractions with like denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, 16 and 100. Fractions can be greater than one. *Clarification 3:* Data involving decimals are limited to hundredths.
MA.4.FR.1.1:	Model and express a fraction, including mixed numbers and fractions greater than one, with the denominator 10 as an equivalent fraction with the denominator 100. **Clarifications:** *Clarification 1:* Instruction emphasizes conceptual understanding through the use of manipulatives, visual models, number lines or equations.
MA.4.FR.1.2:	Use decimal notation to represent fractions with denominators of 10 or 100, including mixed numbers and fractions greater than 1, and use fractional notation with denominators of 10 or 100 to represent decimals. **Clarifications:** *Clarification 1:* Instruction emphasizes conceptual understanding through the use of manipulatives visual models, number lines or equations. *Clarification 2:* Instruction includes the understanding that a decimal and fraction that are equivalent represent the same point on the number line and that fractions with denominators of 10 or powers of 10 may be called decimal fractions.
MA.4.FR.1.3:	Identify and generate equivalent fractions, including fractions greater than one. Describe how the numerator and denominator are affected when the equivalent fraction is created. **Clarifications:** *Clarification 1:* Instruction includes the use of manipulatives, visual models, number lines or equations. *Clarification 2:* Instruction includes recognizing how the numerator and denominator are affected when equivalent fractions are generated.
MA.4.FR.1.4:	Plot, order and compare fractions, including mixed numbers and fractions greater than one, with different numerators and different denominators. **Clarifications:** *Clarification 1:* When comparing fractions, instruction includes using an appropriately scaled number line and using reasoning about their size. *Clarification 2:* Instruction includes using benchmark quantities, such as 0, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ and 1, to compare fractions. *Clarification 3:* Denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, 16 and 100. *Clarification 4:* Within this benchmark, the expectation is to use symbols (<, > or =).
MA.4.FR.2.1:	Decompose a fraction, including mixed numbers and fractions greater than one, into a sum of fractions with the same denominator in multiple ways. Demonstrate each decomposition with objects, drawings and equations. **Clarifications:** *Clarification 1:* Denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, 16 and 100.
MA.4.FR.2.2:	Add and subtract fractions with like denominators, including mixed numbers and fractions greater than one, with procedural reliability. **Clarifications:** *Clarification 1:* Instruction includes the use of word form, manipulatives, drawings, the properties of operations or number lines. *Clarification 2:* Within this benchmark, the expectation is not to simplify or use lowest terms. *Clarification 3:* Denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, 16 and 100.
MA.4.FR.2.3:	Explore the addition of a fraction with denominator of 10 to a fraction with denominator of 100 using equivalent fractions. **Clarifications:** *Clarification 1:* Instruction includes the use of visual models. *Clarification 2:* Within this benchmark, the expectation is not to simplify or use lowest terms.
MA.4.FR.2.4:	Extend previous understanding of multiplication to explore the multiplication of a fraction by a whole number or a whole number by a fraction. **Clarifications:** *Clarification 1:* Instruction includes the use of visual models or number lines and the connection to the commutative property of multiplication. Refer to Properties of Operation, Equality and Inequality (Appendix D). *Clarification 2:* Within this benchmark, the expectation is not to simplify or use lowest terms. *Clarification 3:* Fractions multiplied by a whole number are limited to less than 1. All denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, 16, 100.
MA.4.GR.1.1:	Informally explore angles as an attribute of two-dimensional figures. Identify and classify angles as acute, right, obtuse, straight or reflex. **Clarifications:** *Clarification 1:* Instruction includes classifying angles using benchmark angles of 90° and 180° in two-dimensional figures. *Clarification 2:* When identifying angles, the expectation includes two-dimensional figures and real-world pictures.
MA.4.GR.1.2:	Estimate angle measures. Using a protractor, measure angles in whole-number degrees and draw angles of specified measure in whole-number degrees. Demonstrate that angle measure is additive. **Clarifications:** *Clarification 1:* Instruction includes measuring given angles and drawing angles using protractors. *Clarification 2:* Instruction includes estimating angle measures using benchmark angles (30°, 45°, 60°, 90° and 180°). *Clarification 3:* Instruction focuses on the understanding that angles can be decomposed into non-overlapping angles whose measures sum to the measure of the original angle.
MA.4.GR.1.3:	Solve real-world and mathematical problems involving unknown whole-number angle measures. Write an equation to represent the unknown. **Clarifications:** *Clarification 1:* Instruction includes the connection to angle measure as being additive.

MA.4.GR.2.1:	Solve perimeter and area mathematical and real-world problems, including problems with unknown sides, for rectangles with whole-number side lengths. **Clarifications:** *Clarification 1:* Instruction extends the development of algebraic thinking where the symbolic representation of the unknown uses a letter. *Clarification 2:* Problems involving multiplication are limited to products of up to 3 digits by 2 digits. Problems involving division are limited to up to 4 digits divided by 1 digit. *Clarification 3:* Responses include the appropriate units in word form.
MA.4.GR.2.2:	Solve problems involving rectangles with the same perimeter and different areas or with the same area and different perimeters. **Clarifications:** *Clarification 1:* Instruction focuses on the conceptual understanding of the relationship between perimeter and area. *Clarification 2:* Within this benchmark, rectangles are limited to having whole-number side lengths. *Clarification 3:* Problems involving multiplication are limited to products of up to 3 digits by 2 digits. Problems involving division are limited to up to 4 digits divided by 1 digit. *Clarification 4:* Responses include the appropriate units in word form.
MA.4.M.1.1:	Select and use appropriate tools to measure attributes of objects. **Clarifications:** *Clarification 1:* Attributes include length, volume, weight, mass and temperature. *Clarification 2:* Instruction includes digital measurements and scales that are not linear in appearance. *Clarification 3:* When recording measurements, use fractions and decimals where appropriate.
MA.4.M.1.2:	Convert within a single system of measurement using the units: yards, feet, inches; kilometers, meters, centimeters, millimeters; pounds, ounces; kilograms, grams; gallons, quarts, pints, cups; liter, milliliter; and hours, minutes, seconds. **Clarifications:** *Clarification 1:* Instruction includes the understanding of how to convert from smaller to larger units or from larger to smaller units. *Clarification 2:* Within the benchmark, the expectation is not to convert from grams to kilograms, meters to kilometers or milliliters to liters. *Clarification 3:* Problems involving fractions are limited to denominators of 2, 3, 4, 5, 6, 8, 10, 12, 16 and 100.
MA.4.M.2.1:	Solve two-step real-world problems involving distances and intervals of time using any combination of the four operations. **Clarifications:** *Clarification 1:* Problems involving fractions will include addition and subtraction with like denominators and multiplication of a fraction by a whole number or a whole number by a fraction. *Clarification 2:* Problems involving fractions are limited to denominators of 2, 3, 4, 5, 6, 8, 10, 12, 16 and 100. *Clarification 3:* Within the benchmark, the expectation is not to use decimals.
MA.4.M.2.2:	Solve one- and two-step addition and subtraction real-world problems involving money using decimal notation.
MA.4.NSO.1.1:	Express how the value of a digit in a multi-digit whole number changes if the digit moves one place to the left or right.
MA.4.NSO.1.2:	Read and write multi-digit whole numbers from 0 to 1,000,000 using standard form, expanded form and word form.
MA.4.NSO.1.3:	Plot, order and compare multi-digit whole numbers up to 1,000,000. **Clarifications:** *Clarification 1:* When comparing numbers, instruction includes using an appropriately scaled number line and using place values of the hundred thousands, ten thousands, thousands, hundreds, tens and ones digits. *Clarification 2:* Scaled number lines must be provided and can be a representation of any range of numbers. *Clarification 3:* Within this benchmark, the expectation is to use symbols (<, > or =).
MA.4.NSO.1.4:	Round whole numbers from 0 to 10,000 to the nearest 10, 100 or 1,000.
MA.4.NSO.1.5:	Plot, order and compare decimals up to the hundredths. **Clarifications:** *Clarification 1:* When comparing numbers, instruction includes using an appropriately scaled number line and using place values of the ones, tenths and hundredths digits. *Clarification 2:* Within the benchmark, the expectation is to explain the reasoning for the comparison and use symbols (<, > or =). *Clarification 3:* Scaled number lines must be provided and can be a representation of any range of numbers.
MA.4.NSO.2.1:	Recall multiplication facts with factors up to 12 and related division facts with automaticity.
MA.4.NSO.2.2:	Multiply two whole numbers, up to three digits by up to two digits, with procedural reliability. **Clarifications:** *Clarification 1:* Instruction focuses on helping a student choose a method they can use reliably. *Clarification 2:* Instruction includes the use of models or equations based on place value and the distributive property.
MA.4.NSO.2.3:	Multiply two whole numbers, each up to two digits, including using a standard algorithm with procedural fluency.
MA.4.NSO.2.4:	Divide a whole number up to four digits by a one-digit whole number with procedural reliability. Represent remainders as fractional parts of the divisor. **Clarifications:** *Clarification 1:* Instruction focuses on helping a student choose a method they can use reliably. *Clarification 2:* Instruction includes the use of models based on place value, properties of operations or the relationship between multiplication and division.
	Explore the multiplication and division of multi-digit whole numbers using estimation, rounding and place value. **Clarifications:**

MA.4.NSO.2.5:	*Clarification 1:* Instruction focuses on previous understanding of multiplication with multiples of 10 and 100, and seeing division as a missing factor problem. *Clarification 2:* Estimating quotients builds the foundation for division using a standard algorithm. *Clarification 3:* When estimating the division of whole numbers, dividends are limited to up to four digits and divisors are limited to up to two digits.
MA.4.NSO.2.6:	Identify the number that is one-tenth more, one-tenth less, one-hundredth more and one-hundredth less than a given number.
MA.4.NSO.2.7:	Explore the addition and subtraction of multi-digit numbers with decimals to the hundredths. **Clarifications:** *Clarification 1:* Instruction includes the connection to money and the use of manipulatives and models based on place value.
MA.K12.MTR.1.1:	Mathematicians who participate in effortful learning both individually and with others: • Analyze the problem in a way that makes sense given the task. • Ask questions that will help with solving the task. • Build perseverance by modifying methods as needed while solving a challenging task. • Stay engaged and maintain a positive mindset when working to solve tasks. • Help and support each other when attempting a new method or approach. **Clarifications:** Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: • Build understanding through modeling and using manipulatives. • Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. • Progress from modeling problems with objects and drawings to using algorithms and equations. • Express connections between concepts and representations. • Choose a representation based on the given context or purpose. **Clarifications:** Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations. **Clarifications:** Teachers who encourage students to complete tasks with mathematical fluency: • Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. • Offer multiple opportunities for students to practice efficient and generalizable methods. • Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: • Communicate mathematical ideas, vocabulary and methods effectively. • Analyze the mathematical thinking of others. • Compare the efficiency of a method to those expressed by others. • Recognize errors and suggest how to correctly solve the task. • Justify results by explaining methods and processes. • Construct possible arguments based on evidence. **Clarifications:** Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers.
	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts.

MA.K12.MTR.5.1:	• Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. **Clarifications:** Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. **Clarifications:** Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems. • Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. **Clarifications:** Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. **Clarifications:** K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. **Clarifications:** See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. **Clarifications:** Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. **Clarifications:** In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think _______ because ______." The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. **Clarifications:** Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to

	do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. **Clarifications:** In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

VERSION DESCRIPTION

The benchmarks in this course are mastery goals that students are expected to attain by the end of the year. To build mastery, students will continue to review and apply earlier grade-level benchmarks and expectations.

GENERAL NOTES

In grade 4, instructional time will emphasize four areas: (1) extending understanding of multi-digit multiplication and division; (2) developing the relationship between fractions and decimals and beginning operations with both; (3) classifying and measuring angles and (4) developing an understanding for interpreting data to include mode, median and range.

Curricular content for all subjects must integrate critical-thinking, problem-solving, and workforce-literacy skills; communication, reading, and writing skills; mathematics skills; collaboration skills; contextual and applied-learning skills; technology-literacy skills; information and media-literacy skills; and civic-engagement skills.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:
https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Number: 5012060

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades PreK to 5 Education Courses > **Subject:** Mathematics > **SubSubject:** General Mathematics >

Abbreviated Title: GRADE FOUR MATH

Course Length: Year (Y)

Course Type: Core Academic Course

Course Level: 2

Course Status: State Board Approved

Educator Certifications

Elementary Education (Elementary Grades 1-6)
Mathematics (Elementary Grades 1-6)
Elementary Education (Grades K-6)

Accelerated Mathematics Plan Grade 4 (#5012065) 2019 - 2022 (current)

Course Standards

Name	Description
MAFS.4.G.1.3:	Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.
MAFS.4.MD.1.2:	Use the four operations to solve word problems[1] involving distances, intervals of time, and money, including problems involving simple fractions or decimals[2]. Represent fractional quantities of distance and intervals of time using linear models. ([1]See glossary Table 1 and Table 2) ([2]Computational fluency with fractions and decimals is not the goal for students at this grade level.)
MAFS.4.MD.2.4:	Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. *For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.*
MAFS.4.NBT.1.1:	Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. *For example, recognize that 700 ÷ 70 = 10 by applying concepts of place value and division.*
MAFS.4.NBT.2.6:	Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. **Clarifications:** **Examples of Opportunities for In-Depth Focus** When students work toward meeting this standard, they combine prior understanding of multiplication and division with deepening understanding of the base-ten system of units to find whole-number quotients and remainders with up to four-digit dividends and one- digit divisors. This work will develop further in grade 5 and culminate in fluency with the standard algorithms in grade 6.
MAFS.4.NF.2.3:	Understand a fraction a/b with a > 1 as a sum of fractions 1/b. a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. b. Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. *Examples: 3/8 = 1/8 + 1/8 + 1/8 ; 3/8 = 1/8 + 2/8 ; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8.* c. Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction. d. Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem. **Clarifications:** **Examples of Opportunities for In-Depth Focus** This standard represents an important step in the multi-grade progression for addition and subtraction of fractions. Students extend their prior understanding of addition and subtraction to add and subtract fractions with like denominators by thinking of adding or subtracting so many unit fractions.
MAFS.4.NF.2.4:	Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. a. Understand a fraction a/b as a multiple of 1/b. *For example, use a visual fraction model to represent 5/4 as the product 5 × (1/4), recording the conclusion by the equation 5/4 = 5 × (1/4).* b. Understand a multiple of a/b as a multiple of 1/b, and use this understanding to multiply a fraction by a whole number. *For example, use a visual fraction model to express 3 × (2/5) as 6 × (1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.)* c. Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. *For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?* **Clarifications:** **Examples of Opportunities for In-Depth Focus** This standard represents an important step in the multi-grade progression for multiplication and division of fractions. Students extend their developing understanding of multiplication to multiply a fraction by a whole number.
MAFS.4.NF.3.5:	Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. *For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100.*
MAFS.4.NF.3.6:	Use decimal notation for fractions with denominators 10 or 100. *For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram.*
MAFS.4.NF.3.7:	Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model.
MAFS.4.OA.1.1:	Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.

MAFS.4.OA.3.5:	Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. *For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.*
MAFS.5.G.1.1:	Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).
MAFS.5.G.1.2:	Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.
MAFS.5.G.2.3:	Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. *For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.*
MAFS.5.G.2.4:	Classify and organize two-dimensional figures into Venn diagrams based on the attributes of the figures.
MAFS.5.MD.1.1:	Convert among different-sized standard measurement units (i.e., km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec) within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.
MAFS.5.MD.2.2:	Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.*
MAFS.5.MD.3.3:	Recognize volume as an attribute of solid figures and understand concepts of volume measurement. a. A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume. b. A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units.
MAFS.5.MD.3.4:	Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.
MAFS.5.MD.3.5:	Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume. a. Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication. b. Apply the formulas V = l × w × h and V = B × h for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems. c. Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems. **Clarifications:** **Examples of Opportunities for In-Depth Focus** Students work with volume as an attribute of a solid figure and as a measurement quantity. Students also relate volume to multiplication and addition. This work begins a progression leading to valuable skills in geometric measurement in middle school.
MAFS.5.NBT.1.1:	Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left. **Clarifications:** **Examples of Opportunities for In-Depth Focus** The extension of the place value system from whole numbers to decimals is a major intellectual accomplishment involving understanding and skill with base-ten units and fractions.
MAFS.5.NBT.1.2:	Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.
MAFS.5.NBT.1.3:	Read, write, and compare decimals to thousandths. a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., 347.392 = 3 × 100 + 4 × 10 + 7 × 1 + 3 × (1/10) + 9 × (1/100) + 2 × (1/1000). b. Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.
MAFS.5.NBT.1.4:	Use place value understanding to round decimals to any place.
MAFS.5.NBT.2.5:	Fluently multiply multi-digit whole numbers using the standard algorithm. **Clarifications:** **Fluency Expectations or Examples of Culminating Standards** 5.NBT.2.5 Students fluently multiply multi-digit whole numbers using the standard algorithm.
MAFS.5.NBT.2.6:	Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. **Clarifications:** **Examples of Opportunities for In-Depth Focus** The extension from one-digit divisors to two-digit divisors requires care. This is a major milestone along the way to reaching fluency with the standard algorithm in grade 6 (6.NS.2).
MAFS.5.NBT.2.7:	Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.
	Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as

MAFS.5.NF.1.1:	to produce an equivalent sum or difference of fractions with like denominators. *For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (ad + bc)/bd.)*
MAFS.5.NF.1.2:	Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. *For example, recognize an incorrect result 2/5 + 1/2 = 3/7, by observing that 3/7 < 1/2.* **Clarifications:** **Examples of Opportunities for In-Depth Focus** When students meet this standard, they bring together the threads of fraction equivalence (grades 3–5) and addition and subtraction (grades K–4) to fully extend addition and subtraction to fractions.
MAFS.5.NF.2.3:	Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. *For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?*
MAFS.5.NF.2.4:	Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. a. Interpret the product *(a/b)* × *q* as a parts of a partition of *q* into *b* equal parts; equivalently, as the result of a sequence of operations *a* × *q* ÷ *b*. *For example, use a visual fraction model to show (2/3) × 4 = 8/3, and create a story context for this equation. Do the same with (2/3) × (4/5) = 8/15. (In general, (a/b) × (c/d) = ac/bd.)* b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas. **Clarifications:** **Examples of Opportunities for In-Depth Focus** When students meet this standard, they fully extend multiplication to fractions, making division of fractions in grade 6 (6.NS.1) a near target.
MAFS.5.NF.2.5:	Interpret multiplication as scaling (resizing), by: a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication. b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence *a/b = (n×a)/(n×b)* to the effect of multiplying *a/b* by 1.
MAFS.5.NF.2.6:	Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.
MAFS.5.NF.2.7:	Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. *For example, create a story context for (1/3) ÷ 4, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that (1/3) ÷ 4 = 1/12 because (1/12) × 4 = 1/3.* b. Interpret division of a whole number by a unit fraction, and compute such quotients. *For example, create a story context for 4 ÷ (1/5), and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that 4 ÷ (1/5) = 20 because 20 × (1/5) = 4.* c. Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, how much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?*
MAFS.5.OA.1.1:	Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.
MAFS.5.OA.1.2:	Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. *For example, express the calculation "add 8 and 7, then multiply by 2" as 2 × (8 + 7). Recognize that 3 × (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.*
MAFS.5.OA.2.3:	Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. *For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.*
MAFS.K12.MP.1.1:	**Make sense of problems and persevere in solving them.** Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
MAFS.K12.MP.2.1:	**Reason abstractly and quantitatively**. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative

	reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
MAFS.K12.MP.3.1:	**Construct viable arguments and critique the reasoning of others.** Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
MAFS.K12.MP.4.1:	**Model with mathematics.** Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
MAFS.K12.MP.5.1:	**Use appropriate tools strategically.** Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
MAFS.K12.MP.6.1:	**Attend to precision.** Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
MAFS.K12.MP.7.1:	**Look for and make use of structure.** Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
MAFS.K12.MP.8.1:	**Look for and express regularity in repeated reasoning.** Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
LAFS.5.SL.1.1:	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grade 5 topics and texts*, building on others' ideas and expressing their own clearly. a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion. b. Follow agreed-upon rules for discussions and carry out assigned roles. c. Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others. d. Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.
LAFS.5.SL.1.2:	Summarize a written text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.
LAFS.5.SL.1.3:	Summarize the points a speaker makes and explain how each claim is supported by reasons and evidence.
	Write informative/explanatory texts to examine a topic and convey ideas and information clearly. a. Introduce a topic clearly, provide a general observation and focus, and group related information logically; include formatting (e.g., headings), illustrations, and multimedia when useful to aiding comprehension.

LAFS.5.W.1.2:	b. Develop the topic with facts, definitions, concrete details, quotations, or other information and examples related to the topic. c. Link ideas within and across categories of information using words, phrases, and clauses (e.g., in contrast, especially). d. Use precise language and domain-specific vocabulary to inform about or explain the topic. e. Provide a concluding statement or section related to the information or explanation presented.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

VERSION DESCRIPTION

In this course, instructional time should focus on three critical areas: (1) developing fluency with addition and subtraction of fractions, and developing understanding of the multiplication of fractions and of division of fractions in limited cases (unit fractions divided by whole numbers and whole numbers divided by unit fractions); (2) extending division to 2-digit divisors, integrating decimal fractions into the place value system and developing understanding of operations with decimals to hundredths, and developing fluency with whole number and decimal operations; and (3) developing understanding of volume.

(1) Students extend previous understandings about how fractions are built from unit fractions, composing fractions from unit fractions, decomposing fractions into unit fractions, and using the meaning of fractions and the meaning of multiplication to multiply a fraction by a whole number. Students apply their understanding of fractions and fraction models to represent the addition and subtraction of fractions with unlike denominators as equivalent calculations with like denominators. They develop fluency in calculating sums and differences of fractions, and make reasonable estimates of them. Students also use the meaning of fractions, of multiplication and division, and the relationship between multiplication and division to understand and explain why the procedures for multiplying and dividing fractions make sense. (Note: this is limited to the case of dividing unit fractions by whole numbers and whole numbers by unit fractions.)

(2) Students generalize their understanding of place value to 1,000,000, understanding the relative sizes of numbers in each place. Students apply their understanding of models for division, place value, properties of operations, and the relationship of division to multiplication as they develop, discuss, and use efficient, accurate, and generalization procedures to find quotients involving multi-digit dividends. They select and accurately apply appropriate methods to estimate and mentally calculate quotients, and interpret remainders based upon the context. Students develop understanding of why division procedures work based on the meaning of base-ten numerals and properties of operations. They finalize fluency with multi-digit addition, subtraction, multiplication, and division. They apply their understandings of models for decimals, decimal notation, and properties of operations to add and subtract decimals to hundredths. They develop fluency in these computations, and make reasonable estimates of their results. Students use the relationship between decimals and fractions, as well as the relationship between finite decimals and whole numbers (i.e., a finite decimal multiplied by an appropriate power of 10 is a whole number), to understand and explain why the procedures for multiplying and dividing finite decimals make sense. They compute products and quotients of decimals to hundredths efficiently and accurately.

(3) Students recognize volume as an attribute of three-dimensional space. They understand that volume can be measured by finding the total number of same-size units of volume required to fill the space without gaps or overlaps. They understand that a 1-unit by 1-unit by 1-unit cube is the standard unit for measuring volume. They select appropriate units, strategies, and tools for solving problems that involve estimating and measuring volume. They decompose three-dimensional shapes and find volumes of right rectangular prisms by viewing them as decomposed into layers of arrays of cubes. They measure necessary attributes of shapes in order to determine volumes to solve real world and mathematical problems.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: {{AzureStorageLink}}/uploads/docs/standards/eld/ma.pdf.

For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

GENERAL INFORMATION

Course Number: 5012065

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades PreK to 5 Education Courses > **Subject:** Mathematics > **SubSubject:** General Mathematics >

Abbreviated Title: ACCEL MATH GRADE 4

Course Length: Year (Y)

Course Attributes:

- Honors
- Class Size Core Required

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 4

Educator Certifications

Elementary Education (Elementary Grades 1-6)
Elementary Education (Grades K-6)
Mathematics (Elementary Grades 1-6)

Course Standards

Name	Description
MA.4.AR.1.1:	Solve real-world problems involving multiplication and division of whole numbers including problems in which remainders must be interpreted within the context. **Clarifications:** *Clarification 1:* Problems involving multiplication include multiplicative comparisons. Refer to Situations Involving Operations with Numbers (Appendix A). *Clarification 2:* Depending on the context, the solution of a division problem with a remainder may be the whole number part of the quotient, the whole number part of the quotient with the remainder, the whole number part of the quotient plus 1, or the remainder. *Clarification 3:* Multiplication is limited to products of up to 3 digits by 2 digits. Division is limited to up to 4 digits divided by 1 digit.
MA.4.AR.1.3:	Solve real-world problems involving multiplication of a fraction by a whole number or a whole number by a fraction. **Clarifications:** *Clarification 1:* Problems include creating real-world situations based on an equation or representing a real-world problem with a visual model or equation. *Clarification 2:* Fractions within problems must reference the same whole. *Clarification 3:* Within this benchmark, the expectation is not to simplify or use lowest terms. *Clarification 4:* Fractions limited to fractions less than one with denominators of 2, 3, 4, 5, 6, 8, 10, 12, 16 and 100.
MA.4.DP.1.1:	Collect and represent numerical data, including fractional values, using tables, stem-and-leaf plots or line plots. **Clarifications:** *Clarification 1:* Denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, 16 and 100.
MA.4.DP.1.2:	Determine the mode, median or range to interpret numerical data including fractional values, represented with tables, stem-and-leaf plots or line plots. **Clarifications:** *Clarification 1:* Instruction includes interpreting data within a real-world context. *Clarification 2:* Instruction includes recognizing that data sets can have one mode, no mode or more than one mode. *Clarification 3:* Within this benchmark, data sets are limited to an odd number when calculating the median. *Clarification 4:* Denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, 16 and 100.
MA.4.DP.1.3:	Solve real-world problems involving numerical data. **Clarifications:** *Clarification 1:* Instruction includes using any of the four operations to solve problems. *Clarification 2:* Data involving fractions with like denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, 16 and 100. Fractions can be greater than one. *Clarification 3:* Data involving decimals are limited to hundredths.
MA.4.FR.1.2:	Use decimal notation to represent fractions with denominators of 10 or 100, including mixed numbers and fractions greater than 1, and use fractional notation with denominators of 10 or 100 to represent decimals. **Clarifications:** *Clarification 1:* Instruction emphasizes conceptual understanding through the use of manipulatives visual models, number lines or equations. *Clarification 2:* Instruction includes the understanding that a decimal and fraction that are equivalent represent the same point on the number line and that fractions with denominators of 10 or powers of 10 may be called decimal fractions.
MA.4.FR.2.4:	Extend previous understanding of multiplication to explore the multiplication of a fraction by a whole number or a whole number by a fraction. **Clarifications:** *Clarification 1:* Instruction includes the use of visual models or number lines and the connection to the commutative property of multiplication. Refer to Properties of Operation, Equality and Inequality (Appendix D). *Clarification 2:* Within this benchmark, the expectation is not to simplify or use lowest terms. *Clarification 3:* Fractions multiplied by a whole number are limited to less than 1. All denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, 16, 100.
MA.4.M.1.1:	Select and use appropriate tools to measure attributes of objects. **Clarifications:** *Clarification 1:* Attributes include length, volume, weight, mass and temperature. *Clarification 2:* Instruction includes digital measurements and scales that are not linear in appearance. *Clarification 3:* When recording measurements, use fractions and decimals where appropriate.
	Convert within a single system of measurement using the units: yards, feet, inches; kilometers, meters, centimeters, millimeters; pounds, ounces; kilograms, grams; gallons, quarts, pints, cups; liter, milliliter; and hours, minutes, seconds.

MA.4.M.1.2:	**Clarifications:** *Clarification 1:* Instruction includes the understanding of how to convert from smaller to larger units or from larger to smaller units. *Clarification 2:* Within the benchmark, the expectation is not to convert from grams to kilograms, meters to kilometers or milliliters to liters. *Clarification 3:* Problems involving fractions are limited to denominators of 2, 3, 4, 5, 6, 8, 10, 12, 16 and 100.
MA.4.M.2.1:	Solve two-step real-world problems involving distances and intervals of time using any combination of the four operations. **Clarifications:** *Clarification 1:* Problems involving fractions will include addition and subtraction with like denominators and multiplication of a fraction by a whole number or a whole number by a fraction. *Clarification 2:* Problems involving fractions are limited to denominators of 2, 3, 4, 5, 6, 8, 10, 12, 16 and 100. *Clarification 3:* Within the benchmark, the expectation is not to use decimals.
MA.4.M.2.2:	Solve one- and two-step addition and subtraction real-world problems involving money using decimal notation.
MA.4.NSO.1.1:	Express how the value of a digit in a multi-digit whole number changes if the digit moves one place to the left or right.
MA.4.NSO.1.5:	Plot, order and compare decimals up to the hundredths. **Clarifications:** *Clarification 1:* When comparing numbers, instruction includes using an appropriately scaled number line and using place values of the ones, tenths and hundredths digits. *Clarification 2:* Within the benchmark, the expectation is to explain the reasoning for the comparison and use symbols (<, > or =). *Clarification 3:* Scaled number lines must be provided and can be a representation of any range of numbers.
MA.4.NSO.2.3:	Multiply two whole numbers, each up to two digits, including using a standard algorithm with procedural fluency.
MA.4.NSO.2.4:	Divide a whole number up to four digits by a one-digit whole number with procedural reliability. Represent remainders as fractional parts of the divisor. **Clarifications:** *Clarification 1:* Instruction focuses on helping a student choose a method they can use reliably. *Clarification 2:* Instruction includes the use of models based on place value, properties of operations or the relationship between multiplication and division.
MA.4.NSO.2.6:	Identify the number that is one-tenth more, one-tenth less, one-hundredth more and one-hundredth less than a given number.
MA.4.NSO.2.7:	Explore the addition and subtraction of multi-digit numbers with decimals to the hundredths. **Clarifications:** *Clarification 1:* Instruction includes the connection to money and the use of manipulatives and models based on place value.
MA.5.AR.1.1:	Solve multi-step real-world problems involving any combination of the four operations with whole numbers, including problems in which remainders must be interpreted within the context. **Clarifications:** *Clarification 1:* Depending on the context, the solution of a division problem with a remainder may be the whole number part of the quotient, the whole number part of the quotient with the remainder, the whole number part of the quotient plus 1, or the remainder.
MA.5.AR.1.2:	Solve real-world problems involving the addition, subtraction or multiplication of fractions, including mixed numbers and fractions greater than 1. **Clarifications:** *Clarification 1:* Instruction includes the use of visual models and equations to represent the problem.
MA.5.AR.1.3:	Solve real-world problems involving division of a unit fraction by a whole number and a whole number by a unit fraction. **Clarifications:** *Clarification 1:* Instruction includes the use of visual models and equations to represent the problem.
MA.5.AR.2.1:	Translate written real-world and mathematical descriptions into numerical expressions and numerical expressions into written mathematical descriptions. **Clarifications:** *Clarification 1:* Expressions are limited to any combination of the arithmetic operations, including parentheses, with whole numbers, decimals and fractions. *Clarification 2:* Within this benchmark, the expectation is not to include exponents or nested grouping symbols.
MA.5.AR.2.2:	Evaluate multi-step numerical expressions using order of operations. **Clarifications:** *Clarification 1:* Multi-step expressions are limited to any combination of arithmetic operations, including parentheses, with whole numbers, decimals and fractions. *Clarification 2:* Within this benchmark, the expectation is not to include exponents or nested grouping symbols. *Clarification 3:* Decimals are limited to hundredths. Expressions cannot include division of a fraction by a fraction.
MA.5.AR.2.3:	Determine and explain whether an equation involving any of the four operations is true or false. **Clarifications:** *Clarification 1:* Problem types include equations that include parenthesis but not nested parentheses. *Clarification 2:* Instruction focuses on the connection between properties of equality and order of operations.
MA.5.AR.2.4:	Given a mathematical or real-world context, write an equation involving any of the four operations to determine the unknown whole number with the unknown in any position. **Clarifications:** *Clarification 1:* Instruction extends the development of algebraic thinking where the unknown letter is recognized as a variable. *Clarification 2:* Problems include the unknown and different operations on either side of the equal sign
	Given a numerical pattern, identify and write a rule that can describe the pattern as an expression.

MA.5.AR.3.1:	**Clarifications:** *Clarification 1:* Rules are limited to one or two operations using whole numbers.
MA.5.AR.3.2:	Given a rule for a numerical pattern, use a two-column table to record the inputs and outputs. **Clarifications:** *Clarification 1:* Instruction builds a foundation for proportional and linear relationships in later grades. *Clarification 2:* Rules are limited to one or two operations using whole numbers.
MA.5.DP.1.1:	Collect and represent numerical data, including fractional and decimal values, using tables, line graphs or line plots. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is for an estimation of fractional and decimal heights on line graphs. *Clarification 2:* Decimal values are limited to hundredths. Denominators are limited to 1, 2, 3 and 4. Fractions can be greater than one.
MA.5.DP.1.2:	Interpret numerical data, with whole-number values, represented with tables or line plots by determining the mean, mode, median or range. **Clarifications:** *Clarification 1:* Instruction includes interpreting the mean in real-world problems as a leveling out, a balance point or an equal share.
MA.5.FR.1.1:	Given a mathematical or real-world problem, represent the division of two whole numbers as a fraction. **Clarifications:** *Clarification 1:* Instruction includes making a connection between fractions and division by understanding that fractions can also represent division of a numerator by a denominator. *Clarification 2:* Within this benchmark, the expectation is not to simplify or use lowest terms. *Clarification 3:* Fractions can include fractions greater than one.
MA.5.FR.2.1:	Add and subtract fractions with unlike denominators, including mixed numbers and fractions greater than 1, with procedural reliability. **Clarifications:** *Clarification 1:* Instruction includes the use of estimation, manipulatives, drawings or the properties of operations. *Clarification 2:* Instruction builds on the understanding from previous grades of factors up to 12 and their multiples.
MA.5.FR.2.2:	Extend previous understanding of multiplication to multiply a fraction by a fraction, including mixed numbers and fractions greater than 1, with procedural reliability. **Clarifications:** *Clarification 1:* Instruction includes the use of manipulatives, drawings or the properties of operations. *Clarification 2:* Denominators limited to whole numbers up to 20.
MA.5.FR.2.3:	When multiplying a given number by a fraction less than 1 or a fraction greater than 1, predict and explain the relative size of the product to the given number without calculating. **Clarifications:** *Clarification 1:* Instruction focuses on the connection to decimals, estimation and assessing the reasonableness of an answer.
MA.5.FR.2.4:	Extend previous understanding of division to explore the division of a unit fraction by a whole number and a whole number by a unit fraction. **Clarifications:** *Clarification 1:* Instruction includes the use of manipulatives, drawings or the properties of operations. *Clarification 2:* Refer to Situations Involving Operations with Numbers (Appendix A).
MA.5.GR.1.1:	Classify triangles or quadrilaterals into different categories based on shared defining attributes. Explain why a triangle or quadrilateral would or would not belong to a category. **Clarifications:** *Clarification 1:* Triangles include scalene, isosceles, equilateral, acute, obtuse and right; quadrilaterals include parallelograms, rhombi, rectangles, squares and trapezoids.
MA.5.GR.1.2:	Identify and classify three-dimensional figures into categories based on their defining attributes. Figures are limited to right pyramids, right prisms, right circular cylinders, right circular cones and spheres. **Clarifications:** *Clarification 1:* Defining attributes include the number and shape of faces, number and shape of bases, whether or not there is an apex, curved or straight edges and curved or flat faces.
MA.5.GR.2.1:	Find the perimeter and area of a rectangle with fractional or decimal side lengths using visual models and formulas. **Clarifications:** *Clarification 1:* Instruction includes finding the area of a rectangle with fractional side lengths by tiling it with squares having unit fraction side lengths and showing that the area is the same as would be found by multiplying the side lengths. *Clarification 2:* Responses include the appropriate units in word form.
MA.5.GR.3.1:	Explore volume as an attribute of three-dimensional figures by packing them with unit cubes without gaps. Find the volume of a right rectangular prism with whole-number side lengths by counting unit cubes. **Clarifications:** *Clarification 1:* Instruction emphasizes the conceptual understanding that volume is an attribute that can be measured for a three-dimensional figure. The measurement unit for volume is the volume of a unit cube, which is a cube with edge length of 1 unit.
MA.5.GR.3.2:	Find the volume of a right rectangular prism with whole-number side lengths using a visual model and a formula. **Clarifications:** *Clarification 1:* Instruction includes finding the volume of right rectangular prisms by packing the figure with unit cubes, using a visual model or applying a multiplication formula. *Clarification 2:* Right rectangular prisms cannot exceed two-digit edge lengths and responses include the appropriate units in word form.

MA.5.GR.3.3:	Solve real-world problems involving the volume of right rectangular prisms, including problems with an unknown edge length, with whole-number edge lengths using a visual model or a formula. Write an equation with a variable for the unknown to represent the problem. **Clarifications:** *Clarification 1:* Instruction progresses from right rectangular prisms to composite figures composed of right rectangular prisms. *Clarification 2:* When finding the volume of composite figures composed of right rectangular prisms, recognize volume as additive by adding the volume of non-overlapping parts. *Clarification 3:* Responses include the appropriate units in word form.
MA.5.GR.4.1:	Identify the origin and axes in the coordinate system. Plot and label ordered pairs in the first quadrant of the coordinate plane. **Clarifications:** *Clarification 1:* Instruction includes the connection between two-column tables and coordinates on a coordinate plane. *Clarification 2:* Instruction focuses on the connection of the number line to the x- and y-axis. *Clarification 3:* Coordinate planes include axes scaled by whole numbers. Ordered pairs contain only whole numbers.
MA.5.GR.4.2:	Represent mathematical and real-world problems by plotting points in the first quadrant of the coordinate plane and interpret coordinate values of points in the context of the situation. **Clarifications:** *Clarification 1:* Coordinate planes include axes scaled by whole numbers. Ordered pairs contain only whole numbers.
MA.5.M.1.1:	Solve multi-step real-world problems that involve converting measurement units to equivalent measurements within a single system of measurement. **Clarifications:** *Clarification 1:* Within the benchmark, the expectation is not to memorize the conversions. *Clarification 2:* Conversions include length, time, volume and capacity represented as whole numbers, fractions and decimals.
MA.5.M.2.1:	Solve multi-step real-world problems involving money using decimal notation.
MA.5.NSO.1.1:	Express how the value of a digit in a multi-digit number with decimals to the thousandths changes if the digit moves one or more places to the left or right.
MA.5.NSO.1.2:	Read and write multi-digit numbers with decimals to the thousandths using standard form, word form and expanded form.
MA.5.NSO.1.3:	Compose and decompose multi-digit numbers with decimals to the thousandths in multiple ways using the values of the digits in each place. Demonstrate the compositions or decompositions using objects, drawings and expressions or equations.
MA.5.NSO.1.4:	Plot, order and compare multi-digit numbers with decimals up to the thousandths. **Clarifications:** *Clarification 1:* When comparing numbers, instruction includes using an appropriately scaled number line and using place values of digits. *Clarification 2:* Scaled number lines must be provided and can be a representation of any range of numbers. *Clarification 3:* Within this benchmark, the expectation is to use symbols (<, > or =).
MA.5.NSO.1.5:	Round multi-digit numbers with decimals to the thousandths to the nearest hundredth, tenth or whole number.
MA.5.NSO.2.1:	Multiply multi-digit whole numbers including using a standard algorithm with procedural fluency.
MA.5.NSO.2.2:	Divide multi-digit whole numbers, up to five digits by two digits, including using a standard algorithm with procedural fluency. Represent remainders as fractions. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is not to use simplest form for fractions.
MA.5.NSO.2.3:	Add and subtract multi-digit numbers with decimals to the thousandths, including using a standard algorithm with procedural fluency.
MA.5.NSO.2.4:	Explore the multiplication and division of multi-digit numbers with decimals to the hundredths using estimation, rounding and place value. **Clarifications:** *Clarification 1:* Estimating quotients builds the foundation for division using a standard algorithm. *Clarification 2:* Instruction includes the use of models based on place value and the properties of operations.
MA.5.NSO.2.5:	Multiply and divide a multi-digit number with decimals to the tenths by one-tenth and one-hundredth with procedural reliability. **Clarifications:** *Clarification 1:* Instruction focuses on the place value of the digit when multiplying or dividing.
MA.K12.MTR.1.1:	Mathematicians who participate in effortful learning both individually and with others: • Analyze the problem in a way that makes sense given the task. • Ask questions that will help with solving the task. • Build perseverance by modifying methods as needed while solving a challenging task. • Stay engaged and maintain a positive mindset when working to solve tasks. • Help and support each other when attempting a new method or approach. **Clarifications:** Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.
	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: • Build understanding through modeling and using manipulatives. • Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. • Progress from modeling problems with objects and drawings to using algorithms and equations.

MA.K12.MTR.2.1:	• Express connections between concepts and representations. • Choose a representation based on the given context or purpose. **Clarifications:** Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations. **Clarifications:** Teachers who encourage students to complete tasks with mathematical fluency: • Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. • Offer multiple opportunities for students to practice efficient and generalizable methods. • Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: • Communicate mathematical ideas, vocabulary and methods effectively. • Analyze the mathematical thinking of others. • Compare the efficiency of a method to those expressed by others. • Recognize errors and suggest how to correctly solve the task. • Justify results by explaining methods and processes. • Construct possible arguments based on evidence. **Clarifications:** Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. **Clarifications:** Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. **Clarifications:** Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems.

MA.K12.MTR.7.1:	• Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. **Clarifications:** Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. **Clarifications:** K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. **Clarifications:** See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. **Clarifications:** Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. **Clarifications:** In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think _______ because ______." The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. **Clarifications:** Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. **Clarifications:** In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

General Course Information and Notes

VERSION DESCRIPTION

In grade 4 accelerated, instructional time will emphasize six areas: (1) developing the relationship between fractions and decimals; (2) multiplying and dividing multi-digit whole numbers, including using a standard algorithm; (3) adding and subtracting fractions and decimals with procedural fluency, developing an understanding of multiplication and division of fractions and decimals; (4) developing an understanding of the coordinate plane and plotting pairs of numbers in the first quadrant; (5) extending geometric reasoning to include volume and (6) developing an understanding for interpreting data to include mean, mode, median and range.

Curricular content for all subjects must integrate critical-thinking, problem-solving, and workforce-literacy skills; communication, reading, and writing skills; mathematics skills; collaboration skills; contextual and applied-learning skills; technology-literacy skills; information and media-literacy skills; and civic-engagement skills.

GENERAL NOTES

Honors and Accelerated Level Course Note: Accelerated courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Number: 5012065

Course Path: **Section:** Grades PreK to 12 Education Courses > **Grade Group:** Grades PreK to 5 Education Courses > **Subject:** Mathematics > **SubSubject:** General Mathematics >

Abbreviated Title: GR 4 ACCEL MATH

Course Length: Year (Y)

Course Attributes:

- Class Size Core Required

Course Type: Core Academic Course

Course Level: 3

Course Status: State Board Approved

Educator Certifications

Elementary Education (Elementary Grades 1-6)
Elementary Education (Grades K-6)
Mathematics (Elementary Grades 1-6)

Mathematics - Grade Five (#5012070) 2015 - 2022 (current)

Course Standards

Name	Description
MAFS.5.G.1.1:	Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).
MAFS.5.G.1.2:	Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.
MAFS.5.G.2.3:	Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. *For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.*
MAFS.5.G.2.4:	Classify and organize two-dimensional figures into Venn diagrams based on the attributes of the figures.
MAFS.5.MD.1.1:	Convert among different-sized standard measurement units (i.e., km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec) within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.
MAFS.5.MD.2.2:	Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.*
MAFS.5.MD.3.3:	Recognize volume as an attribute of solid figures and understand concepts of volume measurement. a. A cube with side length 1 unit, called a “unit cube,” is said to have “one cubic unit” of volume, and can be used to measure volume. b. A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units.
MAFS.5.MD.3.4:	Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.
MAFS.5.MD.3.5:	Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume. a. Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication. b. Apply the formulas V = l × w × h and V = B × h for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems. c. Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems. **Clarifications:** **Examples of Opportunities for In-Depth Focus** Students work with volume as an attribute of a solid figure and as a measurement quantity. Students also relate volume to multiplication and addition. This work begins a progression leading to valuable skills in geometric measurement in middle school.
MAFS.5.NBT.1.1:	Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left. **Clarifications:** **Examples of Opportunities for In-Depth Focus** The extension of the place value system from whole numbers to decimals is a major intellectual accomplishment involving understanding and skill with base-ten units and fractions.
MAFS.5.NBT.1.2:	Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.
MAFS.5.NBT.1.3:	Read, write, and compare decimals to thousandths. a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., 347.392 = 3 × 100 + 4 × 10 + 7 × 1 + 3 × (1/10) + 9 × (1/100) + 2 × (1/1000). b. Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.
MAFS.5.NBT.1.4:	Use place value understanding to round decimals to any place.
MAFS.5.NBT.2.5:	Fluently multiply multi-digit whole numbers using the standard algorithm. **Clarifications:** **Fluency Expectations or Examples of Culminating Standards** 5.NBT.2.5 Students fluently multiply multi-digit whole numbers using the standard algorithm.
MAFS.5.NBT.2.6:	Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. **Clarifications:**

	Examples of Opportunities for In-Depth Focus The extension from one-digit divisors to two-digit divisors requires care. This is a major milestone along the way to reaching fluency with the standard algorithm in grade 6 (6.NS.2).
MAFS.5.NBT.2.7:	Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.
MAFS.5.NF.1.1:	Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. *For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (ad + bc)/bd.)*
MAFS.5.NF.1.2:	Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. *For example, recognize an incorrect result 2/5 + 1/2 = 3/7, by observing that 3/7 < 1/2.* **Clarifications:** **Examples of Opportunities for In-Depth Focus** When students meet this standard, they bring together the threads of fraction equivalence (grades 3–5) and addition and subtraction (grades K–4) to fully extend addition and subtraction to fractions.
MAFS.5.NF.2.3:	Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. *For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?*
MAFS.5.NF.2.4:	Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. a. Interpret the product *(a/b) × q* as a parts of a partition of *q* into *b* equal parts; equivalently, as the result of a sequence of operations *a × q ÷ b*. *For example, use a visual fraction model to show (2/3) × 4 = 8/3, and create a story context for this equation. Do the same with (2/3) × (4/5) = 8/15. (In general, (a/b) × (c/d) = ac/bd.)* b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas. **Clarifications:** **Examples of Opportunities for In-Depth Focus** When students meet this standard, they fully extend multiplication to fractions, making division of fractions in grade 6 (6.NS.1) a near target.
MAFS.5.NF.2.5:	Interpret multiplication as scaling (resizing), by: a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication. b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence *a/b = (n×a)/(n×b)* to the effect of multiplying *a/b* by 1.
MAFS.5.NF.2.6:	Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.
MAFS.5.NF.2.7:	Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. *For example, create a story context for (1/3) ÷ 4, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that (1/3) ÷ 4 = 1/12 because (1/12) × 4 = 1/3.* b. Interpret division of a whole number by a unit fraction, and compute such quotients. *For example, create a story context for 4 ÷ (1/5), and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that 4 ÷ (1/5) = 20 because 20 × (1/5) = 4.* c. Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, how much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?*
MAFS.5.OA.1.1:	Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.
MAFS.5.OA.1.2:	Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. *For example, express the calculation "add 8 and 7, then multiply by 2" as 2 × (8 + 7). Recognize that 3 × (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.*
MAFS.5.OA.2.3:	Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. *For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.*
MAFS.K12.MP.1.1:	**Make sense of problems and persevere in solving them.** Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems

	using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
MAFS.K12.MP.2.1:	**Reason abstractly and quantitatively**. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
MAFS.K12.MP.3.1:	**Construct viable arguments and critique the reasoning of others.** Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
MAFS.K12.MP.4.1:	**Model with mathematics.** Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
MAFS.K12.MP.5.1:	**Use appropriate tools strategically.** Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
MAFS.K12.MP.6.1:	**Attend to precision.** Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
MAFS.K12.MP.7.1:	**Look for and make use of structure.** Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
MAFS.K12.MP.8.1:	**Look for and express regularity in repeated reasoning.** Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
LAFS.5.SL.1.1:	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grade 5 topics and texts*, building on others' ideas and expressing their own clearly. a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion. b. Follow agreed-upon rules for discussions and carry out assigned roles.

	c. Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others. d. Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.
LAFS.5.SL.1.2:	Summarize a written text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.
LAFS.5.SL.1.3:	Summarize the points a speaker makes and explain how each claim is supported by reasons and evidence.
LAFS.5.W.1.2:	Write informative/explanatory texts to examine a topic and convey ideas and information clearly. a. Introduce a topic clearly, provide a general observation and focus, and group related information logically; include formatting (e.g., headings), illustrations, and multimedia when useful to aiding comprehension. b. Develop the topic with facts, definitions, concrete details, quotations, or other information and examples related to the topic. c. Link ideas within and across categories of information using words, phrases, and clauses (e.g., in contrast, especially). d. Use precise language and domain-specific vocabulary to inform about or explain the topic. e. Provide a concluding statement or section related to the information or explanation presented.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

GENERAL NOTES

MAFS.5

In Grade 5, instructional time should focus on three critical areas: (1) developing fluency with addition and subtraction of fractions, and developing understanding of the multiplication of fractions and of division of fractions in limited cases (unit fractions divided by whole numbers and whole numbers divided by unit fractions); (2) extending division to 2-digit divisors, integrating decimal fractions into the place value system and developing understanding of operations with decimals to hundredths, and developing fluency with whole number and decimal operations; and (3) developing understanding of volume.

(1) Students apply their understanding of fractions and fraction models to represent the addition and subtraction of fractions with unlike denominators as equivalent calculations with like denominators. They develop fluency in calculating sums and differences of fractions, and make reasonable estimates of them. Students also use the meaning of fractions, of multiplication and division, and the relationship between multiplication and division to understand and explain why the procedures for multiplying and dividing fractions make sense. (Note: this is limited to the case of dividing unit fractions by whole numbers and whole numbers by unit fractions.)

(2) Students develop understanding of why division procedures work based on the meaning of base-ten numerals and properties of operations. They finalize fluency with multi-digit addition, subtraction, multiplication, and division. They apply their understandings of models for decimals, decimal notation, and properties of operations to add and subtract decimals to hundredths. They develop fluency in these computations, and make reasonable estimates of their results. Students use the relationship between decimals and fractions, as well as the relationship between finite decimals and whole numbers (i.e., a finite decimal multiplied by an appropriate power of 10 is a whole number), to understand and explain why the procedures for multiplying and dividing finite decimals make sense. They compute products and quotients of decimals to hundredths efficiently and accurately.

(3)Students recognize volume as an attribute of three-dimensional space. They understand that volume can be measured by finding the total number of same-size units of volume required to fill the space without gaps or overlaps. They understand that a 1-unit by 1-unit by 1-unit cube is the standard unit for measuring volume. They select appropriate units, strategies, and tools for solving problems that involve estimating and measuring volume. They decompose three-dimensional shapes and find volumes of right rectangular prisms by viewing them as decomposed into layers of arrays of cubes. They measure necessary attributes of shapes in order to determine volumes to solve real world and mathematical problems.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:
https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

Florida Standards Implementation Guide Focus Section:

The Mathematics Florida Standards Implementation Guide was created to support the teaching and learning of the Mathematics Florida Standards. The guide is compartmentalized into three components: focus, coherence, and rigor.Focus means narrowing the scope of content in each grade or course, so students achieve higher levels of understanding and experience math concepts more deeply. The Mathematics standards allow for the teaching and learning of mathematical concepts focused around major clusters at each grade level, enhanced by supporting and additional clusters. The major, supporting and additional clusters are identified, in relation to each grade or course. The cluster designations for this course are below.

Major Clusters

MAFS.5.NBT.1 Understand the place value system.

MAFS.5.NBT.2 Perform operations with multi-digit whole numbers and with decimals to hundredths.

MAFS.5.NF.1 Use equivalent fractions as a strategy to add and subtract fractions.

MAFS.5.NF.2 Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

MAFS.5.MD.3 Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.

Supporting Clusters

MAFS.5.MD.1 Convert like measurement units within a given measurement system.

MAFS.5.MD.2 Represent and interpret data.

Additional Clusters

MAFS.5.OA.1 Write and interpret numerical expressions.

MAFS.5.OA.2 Analyze patterns and relationships.

MAFS.5.G.1 Graph points on the coordinate plane to solve real-world and mathematical problems.

MAFS.5.G.2 Classify two-dimensional figures into categories based on their properties.

Note: Clusters should not be sorted from major to supporting and then taught in that order. To do so would strip the coherence of the mathematical ideas and miss the opportunity to enhance the major work of the grade with the supporting and additional clusters.

GENERAL INFORMATION

Course Number: 5012070

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades PreK to 5 Education Courses > **Subject:** Mathematics > **SubSubject:** General Mathematics >

Abbreviated Title: MATH GRADE FIVE

Course Length: Year (Y)

Course Attributes:

- Class Size Core Required

Course Type: Core Academic Course

Course Level: 2

Course Status: Course Approved

Grade Level(s): 5

Educator Certifications

Elementary Education (Elementary Grades 1-6)
Mathematics (Elementary Grades 1-6)
Middle Grades Mathematics (Middle Grades 5-9)
Elementary Education (Grades K-6)

Grade Five Mathematics (#5012070) 2022 - And Beyond

Course Standards

Name	Description
MA.5.AR.1.1:	Solve multi-step real-world problems involving any combination of the four operations with whole numbers, including problems in which remainders must be interpreted within the context. **Clarifications:** *Clarification 1:* Depending on the context, the solution of a division problem with a remainder may be the whole number part of the quotient, the whole number part of the quotient with the remainder, the whole number part of the quotient plus 1, or the remainder.
MA.5.AR.1.2:	Solve real-world problems involving the addition, subtraction or multiplication of fractions, including mixed numbers and fractions greater than 1. **Clarifications:** *Clarification 1:* Instruction includes the use of visual models and equations to represent the problem.
MA.5.AR.1.3:	Solve real-world problems involving division of a unit fraction by a whole number and a whole number by a unit fraction. **Clarifications:** *Clarification 1:* Instruction includes the use of visual models and equations to represent the problem.
MA.5.AR.2.1:	Translate written real-world and mathematical descriptions into numerical expressions and numerical expressions into written mathematical descriptions. **Clarifications:** *Clarification 1:* Expressions are limited to any combination of the arithmetic operations, including parentheses, with whole numbers, decimals and fractions. *Clarification 2:* Within this benchmark, the expectation is not to include exponents or nested grouping symbols.
MA.5.AR.2.2:	Evaluate multi-step numerical expressions using order of operations. **Clarifications:** *Clarification 1:* Multi-step expressions are limited to any combination of arithmetic operations, including parentheses, with whole numbers, decimals and fractions. *Clarification 2:* Within this benchmark, the expectation is not to include exponents or nested grouping symbols. *Clarification 3:* Decimals are limited to hundredths. Expressions cannot include division of a fraction by a fraction.
MA.5.AR.2.3:	Determine and explain whether an equation involving any of the four operations is true or false. **Clarifications:** *Clarification 1:* Problem types include equations that include parenthesis but not nested parentheses. *Clarification 2:* Instruction focuses on the connection between properties of equality and order of operations.
MA.5.AR.2.4:	Given a mathematical or real-world context, write an equation involving any of the four operations to determine the unknown whole number with the unknown in any position. **Clarifications:** *Clarification 1:* Instruction extends the development of algebraic thinking where the unknown letter is recognized as a variable. *Clarification 2:* Problems include the unknown and different operations on either side of the equal sign
MA.5.AR.3.1:	Given a numerical pattern, identify and write a rule that can describe the pattern as an expression. **Clarifications:** *Clarification 1:* Rules are limited to one or two operations using whole numbers.
MA.5.AR.3.2:	Given a rule for a numerical pattern, use a two-column table to record the inputs and outputs. **Clarifications:** *Clarification 1:* Instruction builds a foundation for proportional and linear relationships in later grades. *Clarification 2:* Rules are limited to one or two operations using whole numbers.
MA.5.DP.1.1:	Collect and represent numerical data, including fractional and decimal values, using tables, line graphs or line plots. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is for an estimation of fractional and decimal heights on line graphs. *Clarification 2:* Decimal values are limited to hundredths. Denominators are limited to 1, 2, 3 and 4. Fractions can be greater than one.
MA.5.DP.1.2:	Interpret numerical data, with whole-number values, represented with tables or line plots by determining the mean, mode, median or range. **Clarifications:** *Clarification 1:* Instruction includes interpreting the mean in real-world problems as a leveling out, a balance point or an equal share.
MA.5.FR.1.1:	Given a mathematical or real-world problem, represent the division of two whole numbers as a fraction. **Clarifications:** *Clarification 1:* Instruction includes making a connection between fractions and division by understanding that fractions can also represent division of a numerator by a denominator. *Clarification 2:* Within this benchmark, the expectation is not to simplify or use lowest terms. *Clarification 3:* Fractions can include fractions greater than one.

MA.5.FR.2.1:	Add and subtract fractions with unlike denominators, including mixed numbers and fractions greater than 1, with procedural reliability. **Clarifications:** *Clarification 1:* Instruction includes the use of estimation, manipulatives, drawings or the properties of operations. *Clarification 2:* Instruction builds on the understanding from previous grades of factors up to 12 and their multiples.
MA.5.FR.2.2:	Extend previous understanding of multiplication to multiply a fraction by a fraction, including mixed numbers and fractions greater than 1, with procedural reliability. **Clarifications:** *Clarification 1:* Instruction includes the use of manipulatives, drawings or the properties of operations. *Clarification 2:* Denominators limited to whole numbers up to 20.
MA.5.FR.2.3:	When multiplying a given number by a fraction less than 1 or a fraction greater than 1, predict and explain the relative size of the product to the given number without calculating. **Clarifications:** *Clarification 1:* Instruction focuses on the connection to decimals, estimation and assessing the reasonableness of an answer.
MA.5.FR.2.4:	Extend previous understanding of division to explore the division of a unit fraction by a whole number and a whole number by a unit fraction. **Clarifications:** *Clarification 1:* Instruction includes the use of manipulatives, drawings or the properties of operations. *Clarification 2:* Refer to Situations Involving Operations with Numbers (Appendix A).
MA.5.GR.1.1:	Classify triangles or quadrilaterals into different categories based on shared defining attributes. Explain why a triangle or quadrilateral would or would not belong to a category. **Clarifications:** *Clarification 1:* Triangles include scalene, isosceles, equilateral, acute, obtuse and right; quadrilaterals include parallelograms, rhombi, rectangles, squares and trapezoids.
MA.5.GR.1.2:	Identify and classify three-dimensional figures into categories based on their defining attributes. Figures are limited to right pyramids, right prisms, right circular cylinders, right circular cones and spheres. **Clarifications:** *Clarification 1:* Defining attributes include the number and shape of faces, number and shape of bases, whether or not there is an apex, curved or straight edges and curved or flat faces.
MA.5.GR.2.1:	Find the perimeter and area of a rectangle with fractional or decimal side lengths using visual models and formulas. **Clarifications:** *Clarification 1:* Instruction includes finding the area of a rectangle with fractional side lengths by tiling it with squares having unit fraction side lengths and showing that the area is the same as would be found by multiplying the side lengths. *Clarification 2:* Responses include the appropriate units in word form.
MA.5.GR.3.1:	Explore volume as an attribute of three-dimensional figures by packing them with unit cubes without gaps. Find the volume of a right rectangular prism with whole-number side lengths by counting unit cubes. **Clarifications:** *Clarification 1:* Instruction emphasizes the conceptual understanding that volume is an attribute that can be measured for a three-dimensional figure. The measurement unit for volume is the volume of a unit cube, which is a cube with edge length of 1 unit.
MA.5.GR.3.2:	Find the volume of a right rectangular prism with whole-number side lengths using a visual model and a formula. **Clarifications:** *Clarification 1:* Instruction includes finding the volume of right rectangular prisms by packing the figure with unit cubes, using a visual model or applying a multiplication formula. *Clarification 2:* Right rectangular prisms cannot exceed two-digit edge lengths and responses include the appropriate units in word form.
MA.5.GR.3.3:	Solve real-world problems involving the volume of right rectangular prisms, including problems with an unknown edge length, with whole-number edge lengths using a visual model or a formula. Write an equation with a variable for the unknown to represent the problem. **Clarifications:** *Clarification 1:* Instruction progresses from right rectangular prisms to composite figures composed of right rectangular prisms. *Clarification 2:* When finding the volume of composite figures composed of right rectangular prisms, recognize volume as additive by adding the volume of non-overlapping parts. *Clarification 3:* Responses include the appropriate units in word form.
MA.5.GR.4.1:	Identify the origin and axes in the coordinate system. Plot and label ordered pairs in the first quadrant of the coordinate plane. **Clarifications:** *Clarification 1:* Instruction includes the connection between two-column tables and coordinates on a coordinate plane. *Clarification 2:* Instruction focuses on the connection of the number line to the x- and y-axis. *Clarification 3:* Coordinate planes include axes scaled by whole numbers. Ordered pairs contain only whole numbers.
MA.5.GR.4.2:	Represent mathematical and real-world problems by plotting points in the first quadrant of the coordinate plane and interpret coordinate values of points in the context of the situation. **Clarifications:** *Clarification 1:* Coordinate planes include axes scaled by whole numbers. Ordered pairs contain only whole numbers.
MA.5.M.1.1:	Solve multi-step real-world problems that involve converting measurement units to equivalent measurements within a single system of measurement. **Clarifications:** *Clarification 1:* Within the benchmark, the expectation is not to memorize the conversions.

	Clarification 2: Conversions include length, time, volume and capacity represented as whole numbers, fractions and decimals.
MA.5.M.2.1:	Solve multi-step real-world problems involving money using decimal notation.
MA.5.NSO.1.1:	Express how the value of a digit in a multi-digit number with decimals to the thousandths changes if the digit moves one or more places to the left or right.
MA.5.NSO.1.2:	Read and write multi-digit numbers with decimals to the thousandths using standard form, word form and expanded form.
MA.5.NSO.1.3:	Compose and decompose multi-digit numbers with decimals to the thousandths in multiple ways using the values of the digits in each place. Demonstrate the compositions or decompositions using objects, drawings and expressions or equations.
MA.5.NSO.1.4:	Plot, order and compare multi-digit numbers with decimals up to the thousandths. **Clarifications:** *Clarification 1:* When comparing numbers, instruction includes using an appropriately scaled number line and using place values of digits. *Clarification 2:* Scaled number lines must be provided and can be a representation of any range of numbers. *Clarification 3:* Within this benchmark, the expectation is to use symbols (<, > or =).
MA.5.NSO.1.5:	Round multi-digit numbers with decimals to the thousandths to the nearest hundredth, tenth or whole number.
MA.5.NSO.2.1:	Multiply multi-digit whole numbers including using a standard algorithm with procedural fluency.
MA.5.NSO.2.2:	Divide multi-digit whole numbers, up to five digits by two digits, including using a standard algorithm with procedural fluency. Represent remainders as fractions. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is not to use simplest form for fractions.
MA.5.NSO.2.3:	Add and subtract multi-digit numbers with decimals to the thousandths, including using a standard algorithm with procedural fluency.
MA.5.NSO.2.4:	Explore the multiplication and division of multi-digit numbers with decimals to the hundredths using estimation, rounding and place value. **Clarifications:** *Clarification 1:* Estimating quotients builds the foundation for division using a standard algorithm. *Clarification 2:* Instruction includes the use of models based on place value and the properties of operations.
MA.5.NSO.2.5:	Multiply and divide a multi-digit number with decimals to the tenths by one-tenth and one-hundredth with procedural reliability. **Clarifications:** *Clarification 1:* Instruction focuses on the place value of the digit when multiplying or dividing.
MA.K12.MTR.1.1:	Mathematicians who participate in effortful learning both individually and with others: • Analyze the problem in a way that makes sense given the task. • Ask questions that will help with solving the task. • Build perseverance by modifying methods as needed while solving a challenging task. • Stay engaged and maintain a positive mindset when working to solve tasks. • Help and support each other when attempting a new method or approach. **Clarifications:** Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: • Build understanding through modeling and using manipulatives. • Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. • Progress from modeling problems with objects and drawings to using algorithms and equations. • Express connections between concepts and representations. • Choose a representation based on the given context or purpose. **Clarifications:** Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations. **Clarifications:** Teachers who encourage students to complete tasks with mathematical fluency: • Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. • Offer multiple opportunities for students to practice efficient and generalizable methods. • Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
	Engage in discussions that reflect on the mathematical thinking of self and others.

MA.K12.MTR.4.1:	Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: • Communicate mathematical ideas, vocabulary and methods effectively. • Analyze the mathematical thinking of others. • Compare the efficiency of a method to those expressed by others. • Recognize errors and suggest how to correctly solve the task. • Justify results by explaining methods and processes. • Construct possible arguments based on evidence. **Clarifications:** Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. **Clarifications:** Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. **Clarifications:** Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems. • Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. **Clarifications:** Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. **Clarifications:** K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.

ELA.K12.EE.2.1:	**Clarifications:** See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. **Clarifications:** Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. **Clarifications:** In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think _______ because ______." The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. **Clarifications:** Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. **Clarifications:** In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

VERSION DESCRIPTION

The benchmarks in this course are mastery goals that students are expected to attain by the end of the year. To build mastery, students will continue to review and apply earlier grade-level benchmarks and expectations.

GENERAL NOTES

In grade 5, instructional time will emphasize five areas: (1) multiplying and dividing multi-digit whole numbers, including using a standard algorithm; (2) adding and subtracting fractions and decimals with procedural fluency, developing an understanding of multiplication and division of fractions and decimals; (3) developing an understanding of the coordinate plane and plotting pairs of numbers in the first quadrant; (4) extending geometric reasoning to include volume and (5) extending understanding of data to include the mean.

Curricular content for all subjects must integrate critical-thinking, problem-solving, and workforce-literacy skills; communication, reading, and writing skills; mathematics skills; collaboration skills; contextual and applied-learning skills; technology-literacy skills; information and media-literacy skills; and civic-engagement skills.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:
https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Number: 5012070

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades PreK to 5 Education Courses > **Subject:** Mathematics > **SubSubject:** General Mathematics >

Abbreviated Title: GRADE FIVE MATH

Course Length: Year (Y)

Course Type: Core Academic Course

Course Level: 2

Course Status: State Board Approved

Educator Certifications

Elementary Education (Elementary Grades 1-6)
Mathematics (Elementary Grades 1-6)
Middle Grades Mathematics (Middle Grades 5-9)
Elementary Education (Grades K-6)

M/J Mathematics Transfer (#1200220) 2015 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

SUBJECT AREA TRANSFER NUMBERS

Each course transferred into a Florida public school by an out-of-state or non-public school student should be matched with a course title and number when such course provides substantially the same content. However, a few transfer courses may not be close enough in content to be matched. For those courses a subject area transfer number is provided.

GENERAL INFORMATION

Course Number: 1200220

Course Path: **Section:** Grades PreK to 12 Education Courses > **Grade Group:** Grades 6 to 8 Education Courses > **Subject:** Mathematics > **SubSubject:** General Mathematics >

Abbreviated Title: M/J MATH TRAN

Course Length: Year (Y)

Course Type: Transfer Course

Course Status: Course Approved

Grade Level(s): 6,7,8

M/J Intensive Mathematics (MC) (#1204000) 2015 - 2022 (current)

Course Standards

Name	Description
MAFS.6.EE.1.1:	Write and evaluate numerical expressions involving whole-number exponents.
MAFS.6.EE.1.2:	Write, read, and evaluate expressions in which letters stand for numbers. a. Write expressions that record operations with numbers and with letters standing for numbers. *For example, express the calculation "Subtract y from 5" as 5 – y.* b. Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. *For example, describe the expression 2 (8 + 7) as a product of two factors; view (8 + 7) as both a single entity and a sum of two terms.* c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). *For example, use the formulas* $V = s^3$ *and* $A = 6\ s^2$ *to find the volume and surface area of a cube with sides of length s = 1/2.*
MAFS.6.EE.1.3:	Apply the properties of operations to generate equivalent expressions. *For example, apply the distributive property to the expression 3 (2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6 (4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y.* **Clarifications:** **Examples of Opportunities for In-Depth Focus** By applying properties of operations to generate equivalent expressions, students use properties of operations that they are familiar with from previous grades' work with numbers — generalizing arithmetic in the process.
MAFS.6.EE.1.4:	Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). *For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for.*
MAFS.6.EE.2.5:	Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.
MAFS.6.EE.2.6:	Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.
MAFS.6.EE.2.7:	Solve real-world and mathematical problems by writing and solving equations of the form x + p = q and px = q for cases in which p, q and x are all non-negative rational numbers. **Clarifications:** **Examples of Opportunities for In-Depth Focus** When students write equations of the form x + p = q and px = q to solve real-world and mathematical problems, they draw on meanings of operations that they are familiar with from previous grades' work. They also begin to learn algebraic approaches to solving problems.[16] [16] For example, suppose Daniel went to visit his grandmother, who gave him \$5.50. Then he bought a book costing \$9.20 and had \$2.30 left. To find how much money he had before visiting his grandmother, an algebraic approach leads to the equation x + 5.50 – 9.20 = 2.30. An arithmetic approach without using variables at all would be to begin with 2.30, then add 9.20, then subtract 5.50. This yields the desired answer, but students will eventually encounter problems in which arithmetic approaches are unrealistically difficult and algebraic approaches must be used.
MAFS.6.EE.2.8:	Write an inequality of the form x > c or x < c to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form x > c or x < c have infinitely many solutions; represent solutions of such inequalities on number line diagrams.
MAFS.6.EE.3.9:	Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. *For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time.*
MAFS.6.G.1.1:	Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.
MAFS.6.G.1.2:	Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas *V = l w h* and *V = B h* to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.
MAFS.6.G.1.3:	Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.
MAFS.6.G.1.4:	Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.
	Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, create a story context for (2/3) ÷ (3/4) and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that (2/3) ÷ (3/4) = 8/9 because 3/4 of 8/9 is 2/3. (In general, (a/b) ÷ (c/d) = ad/bc.) How much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 3/4-cup servings are in 2/3 of a cup of yogurt? How wide is a rectangular strip of land with length 3/4 mi and area 1/2 square mi?* **Clarifications:**

MAFS.6.NS.1.1:	**Examples of Opportunities for In-Depth Focus** This is a culminating standard for extending multiplication and division to fractions. **Fluency Expectations or Examples of Culminating Standards** Students interpret and compute quotients of fractions and solve word problems involving division of fractions by fractions. This completes the extension of operations to fractions.
MAFS.6.NS.2.2:	Fluently divide multi-digit numbers using the standard algorithm. **Clarifications:** **Fluency Expectations or Examples of Culminating Standards** Students fluently divide multi-digit numbers using the standard algorithm. This is the culminating standard for several years' worth of work with division of whole numbers.
MAFS.6.NS.2.3:	Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation. **Clarifications:** **Fluency Expectations or Examples of Culminating Standards** Students fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation. This is the culminating standard for several years' worth of work relating to the domains of Number and Operations in Base Ten, Operations and Algebraic Thinking, and Number and Operations — Fractions.
MAFS.6.NS.2.4:	Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor. *For example, express 36 + 8 as 4 (9 + 2).*
MAFS.6.NS.3.5:	Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.
MAFS.6.NS.3.6:	Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates. a. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., –(–3) = 3, and that 0 is its own opposite. b. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes. c. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.
MAFS.6.NS.3.7:	Understand ordering and absolute value of rational numbers. a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. *For example, interpret -3 > -7 as a statement that -3 is located to the right of -7 on a number line oriented from left to right.* b. Write, interpret, and explain statements of order for rational numbers in real-world contexts. *For example, write -3 ºC > -7 ºC to express the fact that -3 ºC is warmer than -7 ºC.* c. Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. *For example, for an account balance of -30 dollars, write |-30| = 30 to describe the size of the debt in dollars.* d. Distinguish comparisons of absolute value from statements about order. *For example, recognize that an account balance less than -30 dollars represents a debt greater than 30 dollars.*
MAFS.6.NS.3.8:	Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate. **Clarifications:** **Examples of Opportunities for In-Depth Focus** When students work with rational numbers in the coordinate plane to solve problems, they combine and consolidate elements from the other standards in this cluster.
MAFS.6.RP.1.1:	Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. *For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."*
MAFS.6.RP.1.2:	Understand the concept of a unit rate a/b associated with a ratio a:b with b ≠ 0, and use rate language in the context of a ratio relationship. *For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger."*
	Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. a. Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios. b. Solve unit rate problems including those involving unit pricing and constant speed. *For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?*

MAFS.6.RP.1.3:	c. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent. d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities. e. Understand the concept of Pi as the ratio of the circumference of a circle to its diameter. ([1]See Table 2 Common Multiplication and Division Situations) **Clarifications:** **Examples of Opportunities for In-Depth Focus** When students work toward meeting this standard, they use a range of reasoning and representations to analyze proportional relationships.
MAFS.6.SP.1.1:	Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. *For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.*
MAFS.6.SP.1.2:	Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.
MAFS.6.SP.1.3:	Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.
MAFS.6.SP.2.4:	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
MAFS.6.SP.2.5:	Summarize numerical data sets in relation to their context, such as by: a. Reporting the number of observations. b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.
MAFS.7.EE.1.1:	Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.
MAFS.7.EE.1.2:	Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. *For example, a + 0.05a = 1.05a means that "increase by 5%" is the same as "multiply by 1.05."*
MAFS.7.EE.2.3:	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. *For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.* **Clarifications:** **Fluency Expectations or Examples of Culminating Standards** Students solve multistep problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. This work is the culmination of many progressions of learning in arithmetic, problem solving and mathematical practices. **Examples of Opportunities for In-Depth Focus** This is a major capstone standard for arithmetic and its applications.
MAFS.7.EE.2.4:	Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. a. Solve word problems leading to equations of the form px + q = r and p(x + q) = r, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. *For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?* b. Solve word problems leading to inequalities of the form px + q > r or px + q < r, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. *For example: As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions.* **Clarifications:** **Fluency Expectations or Examples of Culminating Standards** In solving word problems leading to one-variable equations of the form px + q = r and p(x + q) = r, students solve the equations fluently. This will require fluency with rational number arithmetic (7.NS.1.1–1.3), as well as fluency to some extent with applying properties operations to rewrite linear expressions with rational coefficients (7.EE.1.1). **Examples of Opportunities for In-Depth Focus** Work toward meeting this standard builds on the work that led to meeting 6.EE.2.7 and prepares students for the work that will lead to meeting 8.EE.3.7.
MAFS.7.G.1.1:	Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.
MAFS.7.G.1.2:	Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.
MAFS.7.G.1.3:	Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.

MAFS.7.G.2.4:	Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.
MAFS.7.G.2.5:	Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.
MAFS.7.G.2.6:	Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. **Clarifications:** **Examples of Opportunities for In-Depth Focus** Work toward meeting this standard draws together grades 3–6 work with geometric measurement.
MAFS.7.NS.1.1:	Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. a. Describe situations in which opposite quantities combine to make 0. *For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.* b. Understand p + q as the number located a distance |q| from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts. c. Understand subtraction of rational numbers as adding the additive inverse, p – q = p + (–q). Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts. d. Apply properties of operations as strategies to add and subtract rational numbers. **Clarifications:** **Fluency Expectations or Examples of Culminating Standards** Adding, subtracting, multiplying, and dividing rational numbers is the culmination of numerical work with the four basic operations. The number system will continue to develop in grade 8, expanding to become the real numbers by the introduction of irrational numbers, and will develop further in high school, expanding to become the complex numbers with the introduction of imaginary numbers. Because there are no specific standards for rational number arithmetic in later grades and because so much other work in grade 7 depends on rational number arithmetic, fluency with rational number arithmetic should be the goal in grade 7.
MAFS.7.NS.1.2:	Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (–1)(–1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts. b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then –(p/q) = (–p)/q = p/(–q). Interpret quotients of rational numbers by describing real-world contexts. c. Apply properties of operations as strategies to multiply and divide rational numbers. d. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats. **Clarifications:** **Fluency Expectations or Examples of Culminating Standards** Adding, subtracting, multiplying, and dividing rational numbers is the culmination of numerical work with the four basic operations. The number system will continue to develop in grade 8, expanding to become the real numbers by the introduction of irrational numbers, and will develop further in high school, expanding to become the complex numbers with the introduction of imaginary numbers. Because there are no specific standards for rational number arithmetic in later grades and because so much other work in grade 7 depends on rational number arithmetic, fluency with rational number arithmetic should be the goal in grade 7.
MAFS.7.NS.1.3:	Solve real-world and mathematical problems involving the four operations with rational numbers. **Clarifications:** **Examples of Opportunities for In-Depth Focus** When students work toward meeting this standard (which is closely connected to 7.NS.1.1 and 7.NS.1.2), they consolidate their skill and understanding of addition, subtraction, multiplication and division of rational numbers.
MAFS.7.RP.1.1:	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. *For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2/1/4 miles per hour, equivalently 2 miles per hour.*
MAFS.7.RP.1.2:	Recognize and represent proportional relationships between quantities. a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin. b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. c. Represent proportional relationships by equations. *For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn.* d. Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate. **Clarifications:** **Examples of Opportunities for In-Depth Focus**

	Students in grade 7 grow in their ability to recognize, represent, and analyze proportional relationships in various ways, including by using tables, graphs, and equations.
MAFS.7.RP.1.3:	Use proportional relationships to solve multistep ratio and percent problems. *Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.*
MAFS.7.SP.1.1:	Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.
MAFS.7.SP.1.2:	Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. *For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.*
MAFS.7.SP.2.3:	Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. *For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.*
MAFS.7.SP.2.4:	Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. *For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.*
MAFS.7.SP.3.5:	Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.
MAFS.7.SP.3.6:	Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. *For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.*
MAFS.7.SP.3.7:	Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. a. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. *For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected.* b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. *For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?*
MAFS.7.SP.3.8:	Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. a. Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. b. Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., “rolling double sixes”), identify the outcomes in the sample space which compose the event. c. Design and use a simulation to generate frequencies for compound events. *For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?*
MAFS.8.EE.1.1:	Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example,* $3^2 \times = = 1/3^3 = 1/27$.
MAFS.8.EE.1.2:	Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.
MAFS.8.EE.1.3:	Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. *For example, estimate the population of the United States as 3 × and the population of the world as 7 ×, and determine that the world population is more than 20 times larger.*
MAFS.8.EE.1.4:	Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.
MAFS.8.EE.2.5:	Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. *For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.* **Clarifications:** **Examples of Opportunities for In-Depth Focus** When students work toward meeting this standard, they build on grades 6–7 work with proportions and position themselves for grade 8 work with functions and the equation of a line.
MAFS.8.EE.2.6:	Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b.
MAFS.8.EE.3.7:	Solve linear equations in one variable. a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers). b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms. **Clarifications:** **Fluency Expectations or Examples of Culminating Standards** Students have been working informally with one-variable linear equations since as early as kindergarten. This important line of development culminates in grade 8 with the solution of general one-variable linear equations, including cases with infinitely many solutions or no solutions as well as cases requiring algebraic manipulation using properties of operations. Coefficients and constants in these equations may be any rational numbers.

	Examples of Opportunities for In-Depth Focus This is a culminating standard for solving one-variable linear equations.
MAFS.8.EE.3.8:	Analyze and solve pairs of simultaneous linear equations. a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously. b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. *For example, $3x + 2y = 5$ and $3x + 2y = 6$ have no solution because $3x + 2y$ cannot simultaneously be 5 and 6.* c. Solve real-world and mathematical problems leading to two linear equations in two variables. *For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.* **Clarifications:** **Examples of Opportunities for In-Depth Focus** When students work toward meeting this standard, they build on what they know about two-variable linear equations, and they enlarge the varieties of real-world and mathematical problems they can solve.
MAFS.8.F.1.1:	Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.
MAFS.8.F.1.2:	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.* **Clarifications:** **Examples of Opportunities for In-Depth Focus** Work toward meeting this standard repositions previous work with tables and graphs in the new context of input/output rules.
MAFS.8.F.1.3:	Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. *For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.*
MAFS.8.F.2.4:	Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.
MAFS.8.F.2.5:	Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.
MAFS.8.G.1.1:	Verify experimentally the properties of rotations, reflections, and translations: a. Lines are taken to lines, and line segments to line segments of the same length. b. Angles are taken to angles of the same measure. c. Parallel lines are taken to parallel lines.
MAFS.8.G.1.2:	Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.
MAFS.8.G.1.3:	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.
MAFS.8.G.1.4:	Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.
MAFS.8.G.1.5:	Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. *For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.*
MAFS.8.G.2.6:	Explain a proof of the Pythagorean Theorem and its converse.
MAFS.8.G.2.7:	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. **Clarifications:** **Examples of Opportunities for In-Depth Focus** The Pythagorean theorem is useful in practical problems, relates to grade-level work in irrational numbers and plays an important role mathematically in coordinate geometry in high school.
MAFS.8.G.2.8:	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.
MAFS.8.G.3.9:	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems. **Clarifications:** **Fluency Expectations or Examples of Culminating Standards** When students learn to solve problems involving volumes of cones, cylinders, and spheres — together with their previous grade 7 work in angle measure, area, surface area and volume (7.G.2.4–2.6) — they will have acquired a well-developed set of geometric measurement skills. These skills, along with proportional reasoning (7.RP) and multistep numerical problem solving (7.EE.2.3), can be combined and used in flexible ways as part of modeling during high school — not to mention after high school for college and careers.
MAFS.8.NS.1.1:	Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.
MAFS.8.NS.1.2:	Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2). *For example, by truncating the decimal expansion of $\sqrt{2}$, show that $\sqrt{2}$ is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.*

MAFS.8.SP.1.1:	Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.
MAFS.8.SP.1.2:	Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.
MAFS.8.SP.1.3:	Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. *For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.*
MAFS.8.SP.1.4:	Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. *For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?*
MAFS.K12.MP.1.1:	**Make sense of problems and persevere in solving them.** Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
MAFS.K12.MP.2.1:	**Reason abstractly and quantitatively**. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
MAFS.K12.MP.3.1:	**Construct viable arguments and critique the reasoning of others.** Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
MAFS.K12.MP.4.1:	**Model with mathematics.** Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
MAFS.K12.MP.5.1:	**Use appropriate tools strategically.** Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
MAFS.K12.MP.6.1:	**Attend to precision.** Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Look for and make use of structure. Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven

MAFS.K12.MP.7.1:	more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
MAFS.K12.MP.8.1:	**Look for and express regularity in repeated reasoning.** Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
LAFS.6.SL.1.1:	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly. a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion. b. Follow rules for collegial discussions, set specific goals and deadlines, and define individual roles as needed. c. Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under discussion. d. Review the key ideas expressed and demonstrate understanding of multiple perspectives through reflection and paraphrasing.
LAFS.6.SL.1.2:	Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.
LAFS.6.SL.1.3:	Delineate a speaker's argument and specific claims, distinguishing claims that are supported by reasons and evidence from claims that are not.
LAFS.6.SL.2.4:	Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.
LAFS.68.RST.1.3:	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
LAFS.68.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.
LAFS.68.RST.3.7:	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
LAFS.68.WHST.1.1:	Write arguments focused on *discipline-specific content.* a. Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically. b. Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources. c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence. d. Establish and maintain a formal style. e. Provide a concluding statement or section that follows from and supports the argument presented.
LAFS.7.SL.1.1:	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others' ideas and expressing their own clearly. a. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion. b. Follow rules for collegial discussions, track progress toward specific goals and deadlines, and define individual roles as needed. c. Pose questions that elicit elaboration and respond to others' questions and comments with relevant observations and ideas that bring the discussion back on topic as needed. d. Acknowledge new information expressed by others and, when warranted, modify their own views.
LAFS.7.SL.1.2:	Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study.
LAFS.7.SL.1.3:	Delineate a speaker's argument and specific claims, evaluating the soundness of the reasoning and the relevance and sufficiency of the evidence.
LAFS.7.SL.2.4:	Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use appropriate eye contact, adequate volume, and clear pronunciation.
LAFS.8.SL.1.1:	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly. a. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion. b. Follow rules for collegial discussions and decision-making, track progress toward specific goals and deadlines, and define individual roles as needed. c. Pose questions that connect the ideas of several speakers and respond to others' questions and comments with relevant evidence, observations, and ideas. d. Acknowledge new information expressed by others, and, when warranted, qualify or justify their own views in light of the evidence presented.
LAFS.8.SL.1.2:	Analyze the purpose of information presented in diverse media and formats (e.g., visually, quantitatively, orally) and evaluate the motives (e.g., social, commercial, political) behind its presentation.
LAFS.8.SL.1.3:	Delineate a speaker's argument and specific claims, evaluating the soundness of the reasoning and relevance and sufficiency of the evidence and identifying when irrelevant evidence is introduced.
LAFS.8.SL.2.4:	Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.

ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

GENERAL NOTES

Intensive courses have been designed so that the teacher will select the appropriate standards when developing curricula tailored to meet the needs of individual students, taking into account their grade and instructional level. This course should not be used in place of a core mathematics course but is intended to provide intervention for students who require extra mathematics instruction.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

Additional Instructional Resources:
A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGI/cms/review.html?Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

Course Number: 1204000

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 6 to 8 Education Courses > **Subject:** Mathematics > **SubSubject:** Remedial Mathematics >

Abbreviated Title: M/J INTENS MATH (MC)

Course Length: Multiple (M) - Course length can vary

Course Attributes:

- Class Size Core Required

Course Level: 1

Course Status: Course Approved

Grade Level(s): 6,7,8

Educator Certifications

Mathematics (Grades 6-12)
Middle Grades Mathematics (Middle Grades 5-9)
Middle Grades Integrated Curriculum (Middle Grades 5-9)
Elementary Education (Grades K-6)
Elementary Education (Elementary Grades 1-6)

M/J Foundational Skills in Mathematics 6-8 (#1204000) 2022 - And Beyond

Course Standards

Name	Description
MA.6.AR.1.1:	Given a mathematical or real-world context, translate written descriptions into algebraic expressions and translate algebraic expressions into written descriptions.
MA.6.AR.1.2:	Translate a real-world written description into an algebraic inequality in the form of $x > a$, $x < a$, $x \geq a$ or $x \leq a$. Represent the inequality on a number line. **Clarifications:** *Clarification 1:* Variables may be on the left or right side of the inequality symbol.
MA.6.AR.1.3:	Evaluate algebraic expressions using substitution and order of operations. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is to perform all operations with integers. *Clarification 2:* Refer to Properties of Operations, Equality and Inequality (Appendix D).
MA.6.AR.1.4:	Apply the properties of operations to generate equivalent algebraic expressions with integer coefficients. **Clarifications:** *Clarification 1:* Properties include associative, commutative and distributive. *Clarification 2:* Refer to Properties of Operations, Equality and Inequality (Appendix D).
MA.6.AR.2.1:	Given an equation or inequality and a specified set of integer values, determine which values make the equation or inequality true or false. **Clarifications:** *Clarification 1:* Problems include the variable in multiple terms or on either side of the equal sign or inequality symbol.
MA.6.AR.2.2:	Write and solve one-step equations in one variable within a mathematical or real-world context using addition and subtraction, where all terms and solutions are integers. **Clarifications:** *Clarification 1:* Instruction includes using manipulatives, drawings, number lines and inverse operations. *Clarification 2:* Instruction includes equations in the forms x+p=q and p+x=q, where x,p and q are any integer. *Clarification 3:* Problems include equations where the variable may be on either side of the equal sign.
MA.6.AR.2.3:	Write and solve one-step equations in one variable within a mathematical or real-world context using multiplication and division, where all terms and solutions are integers. **Clarifications:** *Clarification 1:* Instruction includes using manipulatives, drawings, number lines and inverse operations. *Clarification 2:* Instruction includes equations in the forms $\frac{x}{p} = q$, where p≠0, and px=q. *Clarification 3:* Problems include equations where the variable may be on either side of the equal sign.
MA.6.AR.2.4:	Determine the unknown decimal or fraction in an equation involving any of the four operations, relating three numbers, with the unknown in any position. **Clarifications:** *Clarification 1:* Instruction focuses on using algebraic reasoning, drawings, and mental math to determine unknowns. *Clarification 2:* Problems include the unknown and different operations on either side of the equal sign. All terms and solutions are limited to positive rational numbers.
MA.6.AR.3.1:	Given a real-world context, write and interpret ratios to show the relative sizes of two quantities using appropriate notation: $\frac{a}{b}$, a to b, or a:b where b ≠ 0. **Clarifications:** *Clarification 1:* Instruction focuses on the understanding that a ratio can be described as a comparison of two quantities in either the same or different units. *Clarification 2:* Instruction includes using manipulatives, drawings, models and words to interpret part-to-part ratios and part-to-whole ratios. *Clarification 3:* The values of a and b are limited to whole numbers.
MA.6.AR.3.2:	Given a real-world context, determine a rate for a ratio of quantities with different units. Calculate and interpret the corresponding unit rate. **Clarifications:** *Clarification 1:* Instruction includes using manipulatives, drawings, models and words and making connections between ratios, rates and unit rates. *Clarification 2:* Problems will not include conversions between customary and metric systems.

MA.6.AR.3.3:	Extend previous understanding of fractions and numerical patterns to generate or complete a two- or three-column table to display equivalent part-to-part ratios and part-to-part-to-whole ratios. **Clarifications:** *Clarification 1:* Instruction includes using two-column tables (e.g., a relationship between two variables) and three-column tables (e.g., part-to-part-to-whole relationship) to generate conversion charts and mixture charts.
MA.6.AR.3.4:	Apply ratio relationships to solve mathematical and real-world problems involving percentages using the relationship between two quantities. **Clarifications:** *Clarification 1:* Instruction includes the comparison of $\frac{part}{whole}$ to $\frac{percent}{100}$ in order to determine the percent, the part or the whole.
MA.6.AR.3.5:	Solve mathematical and real-world problems involving ratios, rates and unit rates, including comparisons, mixtures, ratios of lengths and conversions within the same measurement system. **Clarifications:** *Clarification 1:* Instruction includes the use of tables, tape diagrams and number lines.
MA.6.DP.1.1:	Recognize and formulate a statistical question that would generate numerical data.
MA.6.DP.1.2:	Given a numerical data set within a real-world context, find and interpret mean, median, mode and range. **Clarifications:** *Clarification 1:* Numerical data is limited to positive rational numbers.
MA.6.DP.1.3:	Given a box plot within a real-world context, determine the minimum, the lower quartile, the median, the upper quartile and the maximum. Use this summary of the data to describe the spread and distribution of the data. **Clarifications:** *Clarification 1:* Instruction includes describing range, interquartile range, halves and quarters of the data.
MA.6.DP.1.4:	Given a histogram or line plot within a real-world context, qualitatively describe and interpret the spread and distribution of the data, including any symmetry, skewness, gaps, clusters, outliers and the range. **Clarifications:** *Clarification 1:* Refer to K-12 Mathematics Glossary (Appendix C).
MA.6.DP.1.5:	Create box plots and histograms to represent sets of numerical data within real-world contexts. **Clarifications:** *Clarification 1:* Instruction includes collecting data and discussing ways to collect truthful data to construct graphical representations. *Clarification 2:* Within this benchmark, it is the expectation to use appropriate titles, labels, scales and units when constructing graphical representations. *Clarification 3:* Numerical data is limited to positive rational numbers.
MA.6.DP.1.6:	Given a real-world scenario, determine and describe how changes in data values impact measures of center and variation. **Clarifications:** *Clarification 1:* Instruction includes choosing the measure of center or measure of variation depending on the scenario. *Clarification 2:* The measures of center are limited to mean and median. The measures of variation are limited to range and interquartile range. *Clarification 3:* Numerical data is limited to positive rational numbers.
MA.6.GR.1.1:	Extend previous understanding of the coordinate plane to plot rational number ordered pairs in all four quadrants and on both axes. Identify the x- or y-axis as the line of reflection when two ordered pairs have an opposite x- or y-coordinate.
MA.6.GR.1.2:	Find distances between ordered pairs, limited to the same x-coordinate or the same y-coordinate, represented on the coordinate plane.
MA.6.GR.1.3:	Solve mathematical and real-world problems by plotting points on a coordinate plane, including finding the perimeter or area of a rectangle. **Clarifications:** *Clarification 1:* Instruction includes finding distances between points, computing dimensions of a rectangle or determining a fourth vertex of a rectangle. *Clarification 2:* Problems involving rectangles are limited to cases where the sides are parallel to the axes.
MA.6.GR.2.1:	Derive a formula for the area of a right triangle using a rectangle. Apply a formula to find the area of a triangle. **Clarifications:** *Clarification 1:* Instruction focuses on the relationship between the area of a rectangle and the area of a right triangle. *Clarification 2:* Within this benchmark, the expectation is to know from memory a formula for the area of a triangle.
MA.6.GR.2.2:	Solve mathematical and real-world problems involving the area of quadrilaterals and composite figures by decomposing them into triangles or rectangles. **Clarifications:** *Clarification 1:* Problem types include finding area of composite shapes and determining missing dimensions. *Clarification 2:* Within this benchmark, the expectation is to know from memory a formula for the area of a rectangle and triangle. *Clarification 3:* Dimensions are limited to positive rational numbers.
MA.6.GR.2.3:	Solve mathematical and real-world problems involving the volume of right rectangular prisms with positive rational number edge lengths using a visual model and a formula. **Clarifications:** *Clarification 1:* Problem types include finding the volume or a missing dimension of a rectangular prism.
	Given a mathematical or real-world context, find the surface area of right rectangular prisms and right rectangular pyramids using the figure's net. **Clarifications:** *Clarification 1:* Instruction focuses on representing a right rectangular prism and right rectangular pyramid with its net and on the connection

MA.6.GR.2.4:	between the surface area of a figure and its net. *Clarification 2:* Within this benchmark, the expectation is to find the surface area when given a net or when given a three-dimensional figure. *Clarification 3:* Problems involving right rectangular pyramids are limited to cases where the heights of triangles are given. *Clarification 4:* Dimensions are limited to positive rational numbers.
MA.6.NSO.1.1:	Extend previous understanding of numbers to define rational numbers. Plot, order and compare rational numbers. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is to plot, order and compare positive and negative rational numbers when given in the same form and to plot, order and compare positive rational numbers when given in different forms (fraction, decimal, percentage). *Clarification 2:* Within this benchmark, the expectation is to use symbols (<, > or =).
MA.6.NSO.1.2:	Given a mathematical or real-world context, represent quantities that have opposite direction using rational numbers. Compare them on a number line and explain the meaning of zero within its context. **Clarifications:** *Clarification 1:* Instruction includes vertical and horizontal number lines, context referring to distances, temperatures and finances and using informal verbal comparisons, such as, lower, warmer or more in debt. *Clarification 2:* Within this benchmark, the expectation is to compare positive and negative rational numbers when given in the same form.
MA.6.NSO.1.3:	Given a mathematical or real-world context, interpret the absolute value of a number as the distance from zero on a number line. Find the absolute value of rational numbers. **Clarifications:** *Clarification 1:* Instruction includes the connection of absolute value to mirror images about zero and to opposites. *Clarification 2:* Instruction includes vertical and horizontal number lines and context referring to distances, temperature and finances.
MA.6.NSO.1.4:	Solve mathematical and real-world problems involving absolute value, including the comparison of absolute value. **Clarifications:** *Clarification 1:* Absolute value situations include distances, temperatures and finances. *Clarification 2:* Problems involving calculations with absolute value are limited to two or fewer operations. *Clarification 3:* Within this benchmark, the expectation is to use integers only.
MA.6.NSO.2.1:	Multiply and divide positive multi-digit numbers with decimals to the thousandths, including using a standard algorithm with procedural fluency. **Clarifications:** *Clarification 1:* Multi-digit decimals are limited to no more than 5 total digits.
MA.6.NSO.2.2:	Extend previous understanding of multiplication and division to compute products and quotients of positive fractions by positive fractions, including mixed numbers, with procedural fluency. **Clarifications:** *Clarification 1:* Instruction focuses on making connections between visual models, the relationship between multiplication and division, reciprocals and algorithms.
MA.6.NSO.2.3:	Solve multi-step real-world problems involving any of the four operations with positive multi-digit decimals or positive fractions, including mixed numbers. **Clarifications:** *Clarification 1:* Within this benchmark, it is not the expectation to include both decimals and fractions within a single problem.
MA.6.NSO.3.1:	Given a mathematical or real-world context, find the greatest common factor and least common multiple of two whole numbers. **Clarifications:** *Clarification 1:* Within this benchmark, expectations include finding greatest common factor within 1,000 and least common multiple with factors to 25. *Clarification 2*: Instruction includes finding the greatest common factor of the numerator and denominator of a fraction to simplify a fraction.
MA.6.NSO.3.2:	Rewrite the sum of two composite whole numbers having a common factor, as a common factor multiplied by the sum of two whole numbers. **Clarifications:** *Clarification 1:* Instruction includes using the distributive property to generate equivalent expressions.
MA.6.NSO.3.3:	Evaluate positive rational numbers and integers with natural number exponents. **Clarifications:** *Clarification 1:* Within this benchmark, expectations include using natural number exponents up to 5.
MA.6.NSO.3.4:	Express composite whole numbers as a product of prime factors with natural number exponents.
MA.6.NSO.3.5:	Rewrite positive rational numbers in different but equivalent forms including fractions, terminating decimals and percentages. **Clarifications:** *Clarification 1:* Rational numbers include decimal equivalence up to the thousandths place.
MA.6.NSO.4.1:	Apply and extend previous understandings of operations with whole numbers to add and subtract integers with procedural fluency. **Clarifications:** *Clarification 1:* Instruction begins with the use of manipulatives, models and number lines working towards becoming procedurally fluent by the end of grade 6. *Clarification 2:* Instruction focuses on the inverse relationship between the operations of addition and subtraction. If p and q are integers, then p-q=p+(-q) and p+q=p-(-q).
	Apply and extend previous understandings of operations with whole numbers to multiply and divide integers with procedural fluency. **Clarifications:** *Clarification 1:* Instruction includes the use of models and number lines and the inverse relationship between multiplication and division, working

MA.6.NSO.4.2:	towards becoming procedurally fluent by the end of grade 6. *Clarification 2:* Instruction focuses on the understanding that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers where q≠0, then $-\left(\frac{p}{q}\right)=\frac{-p}{q}$, $-\left(\frac{p}{q}\right)=\frac{p}{-q}$ and $\frac{p}{q}=\frac{-p}{-q}$.
MA.7.AR.1.1:	Apply properties of operations to add and subtract linear expressions with rational coefficients. **Clarifications:** *Clarification 1:* Instruction includes linear expressions in the form ax±b or b±ax, where a and b are rational numbers. *Clarification 2:* Refer to Properties of Operations, Equality and Inequality (Appendix D).
MA.7.AR.1.2:	Determine whether two linear expressions are equivalent. **Clarifications:** *Clarification 1:* Instruction includes using properties of operations accurately and efficiently. *Clarification 2:* Instruction includes linear expressions in any form with rational coefficients. *Clarification 3:* Refer to Properties of Operations, Equality and Inequality (Appendix D).
MA.7.AR.2.1:	Write and solve one-step inequalities in one variable within a mathematical context and represent solutions algebraically or graphically. **Clarifications:** *Clarification 1:* Instruction focuses on the properties of inequality. Refer to Properties of Operations, Equality and Inequality (Appendix D). *Clarification 2:* Instruction includes inequalities in the forms $px>q$; $\frac{x}{p}>q$; x±p>q and p±x>q, where p and q are specific rational numbers and any inequality symbol can be represented. *Clarification 3:* Problems include inequalities where the variable may be on either side of the inequality symbol.
MA.7.AR.2.2:	Write and solve two-step equations in one variable within a mathematical or real-world context, where all terms are rational numbers. **Clarifications:** *Clarification 1:* Instruction focuses the application of the properties of equality. Refer to Properties of Operations, Equality and Inequality (Appendix D). *Clarification 2:* Instruction includes equations in the forms px±q=r and p(x±q)=r, where p, q and r are specific rational numbers. *Clarification 3:* Problems include linear equations where the variable may be on either side of the equal sign.
MA.7.AR.3.1:	Apply previous understanding of percentages and ratios to solve multi-step real-world percent problems. **Clarifications:** *Clarification 1:* Instruction includes discounts, markups, simple interest, tax, tips, fees, percent increase, percent decrease and percent error.
MA.7.AR.3.2:	Apply previous understanding of ratios to solve real-world problems involving proportions.
MA.7.AR.3.3:	Solve mathematical and real-world problems involving the conversion of units across different measurement systems.
MA.7.AR.4.1:	Determine whether two quantities have a proportional relationship by examining a table, graph or written description. **Clarifications:** *Clarification 1:* Instruction focuses on the connection to ratios and on the constant of proportionality, which is the ratio between two quantities in a proportional relationship.
MA.7.AR.4.2:	Determine the constant of proportionality within a mathematical or real-world context given a table, graph or written description of a proportional relationship.
MA.7.AR.4.3:	Given a mathematical or real-world context, graph proportional relationships from a table, equation or a written description. **Clarifications:** *Clarification 1:* Instruction includes equations of proportional relationships in the form of y=px, where p is the constant of proportionality.
MA.7.AR.4.4:	Given any representation of a proportional relationship, translate the representation to a written description, table or equation. **Clarifications:** *Clarification 1:* Given representations are limited to a written description, graph, table or equation. *Clarification 2:* Instruction includes equations of proportional relationships in the form of y=px, where p is the constant of proportionality.
MA.7.AR.4.5:	Solve real-world problems involving proportional relationships.
MA.7.DP.1.1:	Determine an appropriate measure of center or measure of variation to summarize numerical data, represented numerically or graphically, taking into consideration the context and any outliers. **Clarifications:** *Clarification 1:* Instruction includes recognizing whether a measure of center or measure of variation is appropriate and can be justified based on the given context or the statistical purpose. *Clarification 2:* Graphical representations are limited to histograms, line plots, box plots and stem-and-leaf plots. *Clarification 3:* The measure of center is limited to mean and median. The measure of variation is limited to range and interquartile range.
MA.7.DP.1.2:	Given two numerical or graphical representations of data, use the measure(s) of center and measure(s) of variability to make comparisons, interpret results and draw conclusions about the two populations. **Clarifications:** *Clarification 1:* Graphical representations are limited to histograms, line plots, box plots and stem-and-leaf plots. *Clarification 2:* The measure of center is limited to mean and median. The measure of variation is limited to range and interquartile range.
MA.7.DP.1.3:	Given categorical data from a random sample, use proportional relationships to make predictions about a population.
MA.7.DP.1.4:	Use proportional reasoning to construct, display and interpret data in circle graphs. **Clarifications:** *Clarification 1:* Data is limited to no more than 6 categories.

MA.7.DP.1.5:	Given a real-world numerical or categorical data set, choose and create an appropriate graphical representation. **Clarifications:** *Clarification 1:* Graphical representations are limited to histograms, bar charts, circle graphs, line plots, box plots and stem-and-leaf plots.
MA.7.DP.2.1:	Determine the sample space for a simple experiment. **Clarifications:** *Clarification 1:* Simple experiments include tossing a fair coin, rolling a fair die, picking a card randomly from a deck, picking marbles randomly from a bag and spinning a fair spinner.
MA.7.DP.2.2:	Given the probability of a chance event, interpret the likelihood of it occurring. Compare the probabilities of chance events. **Clarifications:** *Clarification 1:* Instruction includes representing probability as a fraction, percentage or decimal between 0 and 1 with probabilities close to 1 corresponding to highly likely events and probabilities close to 0 corresponding to highly unlikely events. *Clarification 2:* Instruction includes P(event) notation. *Clarification 3:* Instruction includes representing probability as a fraction, percentage or decimal.
MA.7.DP.2.3:	Find the theoretical probability of an event related to a simple experiment. **Clarifications:** *Clarification 1:* Instruction includes representing probability as a fraction, percentage or decimal. *Clarification 2:* Simple experiments include tossing a fair coin, rolling a fair die, picking a card randomly from a deck, picking marbles randomly from a bag and spinning a fair spinner.
MA.7.DP.2.4:	Use a simulation of a simple experiment to find experimental probabilities and compare them to theoretical probabilities. **Clarifications:** *Clarification 1:* Instruction includes representing probability as a fraction, percentage or decimal. *Clarification 2:* Instruction includes recognizing that experimental probabilities may differ from theoretical probabilities due to random variation. As the number of repetitions increases experimental probabilities will typically better approximate the theoretical probabilities. *Clarification 3:* Experiments include tossing a fair coin, rolling a fair die, picking a card randomly from a deck, picking marbles randomly from a bag and spinning a fair spinner.
MA.7.GR.1.1:	Apply formulas to find the areas of trapezoids, parallelograms and rhombi. **Clarifications:** *Clarification 1:* Instruction focuses on the connection from the areas of trapezoids, parallelograms and rhombi to the areas of rectangles or triangles. *Clarification 2:* Within this benchmark, the expectation is not to memorize area formulas for trapezoids, parallelograms and rhombi.
MA.7.GR.1.2:	Solve mathematical or real-world problems involving the area of polygons or composite figures by decomposing them into triangles or quadrilaterals. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is not to find areas of figures on the coordinate plane or to find missing dimensions.
MA.7.GR.1.3:	Explore the proportional relationship between circumferences and diameters of circles. Apply a formula for the circumference of a circle to solve mathematical and real-world problems. **Clarifications:** *Clarification 1:* Instruction includes the exploration and analysis of circular objects to examine the proportional relationship between circumference and diameter and arrive at an approximation of pi (π) as the constant of proportionality. *Clarification 2:* Solutions may be represented in terms of pi (π) or approximately.
MA.7.GR.1.4:	Explore and apply a formula to find the area of a circle to solve mathematical and real-world problems. **Clarifications:** *Clarification 1:* Instruction focuses on the connection between formulas for the area of a rectangle and the area of a circle. *Clarification 2:* Problem types include finding areas of fractional parts of a circle. *Clarification 3:* Solutions may be represented in terms of pi (π) or approximately.
MA.7.GR.1.5:	Solve mathematical and real-world problems involving dimensions and areas of geometric figures, including scale drawings and scale factors. **Clarifications:** *Clarification 1:* Instruction focuses on seeing the scale factor as a constant of proportionality between corresponding lengths in the scale drawing and the original object. *Clarification 2:* Instruction includes the understanding that if the scaling factor is k, then the constant of proportionality between corresponding areas is k^2 . *Clarification 3:* Problem types include finding the scale factor given a set of dimensions as well as finding dimensions when given a scale factor.
MA.7.GR.2.1:	Given a mathematical or real-world context, find the surface area of a right circular cylinder using the figure’s net. **Clarifications:** *Clarification 1:* Instruction focuses on representing a right circular cylinder with its net and on the connection between surface area of a figure and its net. *Clarification 2:* Within this benchmark, the expectation is to find the surface area when given a net or when given a three-dimensional figure. *Clarification 3:* Within this benchmark, the expectation is not to memorize the surface area formula for a right circular cylinder. Clarification 4: Solutions may be represented in terms of pi (π) or approximately.
	Solve real-world problems involving surface area of right circular cylinders. **Clarifications:**

MA.7.GR.2.2:	*Clarification 1:* Within this benchmark, the expectation is not to memorize the surface area formula for a right circular cylinder or to find radius as a missing dimension. *Clarification 2:* Solutions may be represented in terms of pi (π) or approximately.
MA.7.GR.2.3:	Solve mathematical and real-world problems involving volume of right circular cylinders. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is not to memorize the volume formula for a right circular cylinder or to find radius as a missing dimension. *Clarification 2:* Solutions may be represented in terms of pi (π) or approximately.
MA.7.NSO.1.1:	Know and apply the Laws of Exponents to evaluate numerical expressions and generate equivalent numerical expressions, limited to whole-number exponents and rational number bases. **Clarifications:** *Clarification 1:* Instruction focuses on building the Laws of Exponents from specific examples. Refer to the K-12 Formulas (Appendix E) for the Laws of Exponents. *Clarification 2:* Problems in the form $\frac{a^n}{a^m} = a^p$ must result in a whole-number value for p.
MA.7.NSO.1.2:	Rewrite rational numbers in different but equivalent forms including fractions, mixed numbers, repeating decimals and percentages to solve mathematical and real-world problems.
MA.7.NSO.2.1:	Solve mathematical problems using multi-step order of operations with rational numbers including grouping symbols, whole-number exponents and absolute value. **Clarifications:** *Clarification 1:* Multi-step expressions are limited to 6 or fewer steps.
MA.7.NSO.2.2:	Add, subtract, multiply and divide rational numbers with procedural fluency.
MA.7.NSO.2.3:	Solve real-world problems involving any of the four operations with rational numbers. **Clarifications:** *Clarification 1:* Instruction includes using one or more operations to solve problems.
MA.8.AR.1.1:	Apply the Laws of Exponents to generate equivalent algebraic expressions, limited to integer exponents and monomial bases. **Clarifications:** *Clarification 1:* Refer to the K-12 Formulas (Appendix E) for the Laws of Exponents.
MA.8.AR.1.2:	Apply properties of operations to multiply two linear expressions with rational coefficients. **Clarifications:** *Clarification 1:* Problems are limited to products where at least one of the factors is a monomial. *Clarification 2:* Refer to Properties of Operations, Equality and Inequality (Appendix D).
MA.8.AR.1.3:	Rewrite the sum of two algebraic expressions having a common monomial factor as a common factor multiplied by the sum of two algebraic expressions.
MA.8.AR.2.1:	Solve multi-step linear equations in one variable, with rational number coefficients. Include equations with variables on both sides. **Clarifications:** *Clarification 1:* Problem types include examples of one-variable linear equations that generate one solution, infinitely many solutions or no solution.
MA.8.AR.2.2:	Solve two-step linear inequalities in one variable and represent solutions algebraically and graphically. **Clarifications:** *Clarification 1:* Instruction includes inequalities in the forms $px \pm q > r$ and $p(x \pm q) > r$, where p, q and r are specific rational numbers and where any inequality symbol can be represented. *Clarification 2:* Problems include inequalities where the variable may be on either side of the inequality.
MA.8.AR.2.3:	Given an equation in the form of $x^2=p$ and $x^3=q$, where p is a whole number and q is an integer, determine the real solutions. **Clarifications:** *Clarification 1:* Instruction focuses on understanding that when solving $x^2=p$, there is both a positive and negative solution. *Clarification 2:* Within this benchmark, the expectation is to calculate square roots of perfect squares up to 225 and cube roots of perfect cubes from -125 to 125.
MA.8.AR.3.1:	Determine if a linear relationship is also a proportional relationship. **Clarifications:** *Clarification 1:* Instruction focuses on the understanding that proportional relationships are linear relationships whose graph passes through the origin. *Clarification 2:* Instruction includes the representation of relationships using tables, graphs, equations and written descriptions.
MA.8.AR.3.2:	Given a table, graph or written description of a linear relationship, determine the slope. **Clarifications:** *Clarification 1:* Problem types include cases where two points are given to determine the slope. *Clarification 2:* Instruction includes making connections of slope to the constant of proportionality and to similar triangles represented on the coordinate plane.
MA.8.AR.3.3:	Given a table, graph or written description of a linear relationship, write an equation in slope-intercept form.
MA.8.AR.3.4:	Given a mathematical or real-world context, graph a two-variable linear equation from a written description, a table or an equation in slope-intercept form.
	Given a real-world context, determine and interpret the slope and y-intercept of a two-variable linear equation from a written description, a table, a

MA.8.AR.3.5:	graph or an equation in slope-intercept form. **Clarifications:** *Clarification 1:* Problems include conversions with temperature and equations of lines of fit in scatter plots.
MA.8.AR.4.1:	Given a system of two linear equations and a specified set of possible solutions, determine which ordered pairs satisfy the system of linear equations. **Clarifications:** *Clarification 1:* Instruction focuses on the understanding that a solution to a system of equations satisfies both linear equations simultaneously.
MA.8.AR.4.2:	Given a system of two linear equations represented graphically on the same coordinate plane, determine whether there is one solution, no solution or infinitely many solutions.
MA.8.AR.4.3:	Given a mathematical or real-world context, solve systems of two linear equations by graphing. **Clarifications:** *Clarification 1:* Instruction includes approximating non-integer solutions. *Clarification 2:* Within this benchmark, it is the expectation to represent systems of linear equations in slope-intercept form only. *Clarification 3:* Instruction includes recognizing that parallel lines have the same slope.
MA.8.DP.1.1:	Given a set of real-world bivariate numerical data, construct a scatter plot or a line graph as appropriate for the context. **Clarifications:** *Clarification 1:* Instruction includes recognizing similarities and differences between scatter plots and line graphs, and on determining which is more appropriate as a representation of the data based on the context. *Clarification 2:* Sets of data are limited to 20 points.
MA.8.DP.1.2:	Given a scatter plot within a real-world context, describe patterns of association. **Clarifications:** *Clarification 1:* Descriptions include outliers; positive or negative association; linear or nonlinear association; strong or weak association.
MA.8.DP.1.3:	Given a scatter plot with a linear association, informally fit a straight line. **Clarifications:** *Clarification 1:* Instruction focuses on the connection to linear functions. *Clarification 2:* Instruction includes using a variety of tools, including a ruler, to draw a line with approximately the same number of points above and below the line.
MA.8.DP.2.1:	Determine the sample space for a repeated experiment. **Clarifications:** *Clarification 1:* Instruction includes recording sample spaces for repeated experiments using organized lists, tables or tree diagrams. *Clarification 2:* Experiments to be repeated are limited to tossing a fair coin, rolling a fair die, picking a card randomly from a deck with replacement, picking marbles randomly from a bag with replacement and spinning a fair spinner. *Clarification 3:* Repetition of experiments is limited to two times except for tossing a coin.
MA.8.DP.2.2:	Find the theoretical probability of an event related to a repeated experiment. **Clarifications:** *Clarification 1:* Instruction includes representing probability as a fraction, percentage or decimal. *Clarification 2:* Experiments to be repeated are limited to tossing a fair coin, rolling a fair die, picking a card randomly from a deck with replacement, picking marbles randomly from a bag with replacement and spinning a fair spinner. *Clarification 3:* Repetition of experiments is limited to two times except for tossing a coin.
MA.8.DP.2.3:	Solve real-world problems involving probabilities related to single or repeated experiments, including making predictions based on theoretical probability. **Clarifications:** *Clarification 1:* Instruction includes making connections to proportional relationships and representing probability as a fraction, percentage or decimal. *Clarification 2:* Experiments to be repeated are limited to tossing a fair coin, rolling a fair die, picking a card randomly from a deck with replacement, picking marbles randomly from a bag with replacement and spinning a fair spinner. *Clarification 3:* Repetition of experiments is limited to two times except for tossing a coin.
MA.8.F.1.1:	Given a set of ordered pairs, a table, a graph or mapping diagram, determine whether the relationship is a function. Identify the domain and range of the relation. **Clarifications:** *Clarification 1:* Instruction includes referring to the input as the independent variable and the output as the dependent variable. *Clarification 2:* Within this benchmark, it is the expectation to represent domain and range as a list of numbers or as an inequality.
MA.8.F.1.2:	Given a function defined by a graph or an equation, determine whether the function is a linear function. Given an input-output table, determine whether it could represent a linear function. **Clarifications:** *Clarification 1:* Instruction includes recognizing that a table may not determine a function.
MA.8.F.1.3:	Analyze a real-world written description or graphical representation of a functional relationship between two quantities and identify where the function is increasing, decreasing or constant. **Clarifications:** *Clarification 1:* Problem types are limited to continuous functions. *Clarification 2:* Analysis includes writing a description of a graphical representation or sketching a graph from a written description.
	Apply the Pythagorean Theorem to solve mathematical and real-world problems involving unknown side lengths in right triangles.

MA.8.GR.1.1:	**Clarifications:** *Clarification 1:* Instruction includes exploring right triangles with natural-number side lengths to illustrate the Pythagorean Theorem. *Clarification 2:* Within this benchmark, the expectation is to memorize the Pythagorean Theorem. *Clarification 3:* Radicands are limited to whole numbers up to 225.
MA.8.GR.1.2:	Apply the Pythagorean Theorem to solve mathematical and real-world problems involving the distance between two points in a coordinate plane. **Clarifications:** *Clarification 1:* Instruction includes making connections between distance on the coordinate plane and right triangles. *Clarification 2:* Within this benchmark, the expectation is to memorize the Pythagorean Theorem. It is not the expectation to use the distance formula. *Clarification 3:* Radicands are limited to whole numbers up to 225.
MA.8.GR.1.3:	Use the Triangle Inequality Theorem to determine if a triangle can be formed from a given set of sides. Use the converse of the Pythagorean Theorem to determine if a right triangle can be formed from a given set of sides.
MA.8.GR.1.4:	Solve mathematical problems involving the relationships between supplementary, complementary, vertical or adjacent angles.
MA.8.GR.1.5:	Solve problems involving the relationships of interior and exterior angles of a triangle. **Clarifications:** *Clarification 1:* Problems include using the Triangle Sum Theorem and representing angle measures as algebraic expressions.
MA.8.GR.1.6:	Develop and use formulas for the sums of the interior angles of regular polygons by decomposing them into triangles. **Clarifications:** *Clarification 1:* Problems include representing angle measures as algebraic expressions.
MA.8.GR.2.1:	Given a preimage and image generated by a single transformation, identify the transformation that describes the relationship. **Clarifications:** *Clarification 1:* Within this benchmark, transformations are limited to reflections, translations or rotations of images. *Clarification 2:* Instruction focuses on the preservation of congruence so that a figure maps onto a copy of itself.
MA.8.GR.2.2:	Given a preimage and image generated by a single dilation, identify the scale factor that describes the relationship. **Clarifications:** *Clarification 1:* Instruction includes the connection to scale drawings and proportions. *Clarification 2:* Instruction focuses on the preservation of similarity and the lack of preservation of congruence when a figure maps onto a scaled copy of itself, unless the scaling factor is 1.
MA.8.GR.2.3:	Describe and apply the effect of a single transformation on two-dimensional figures using coordinates and the coordinate plane. **Clarifications:** *Clarification 1:* Within this benchmark, transformations are limited to reflections, translations, rotations or dilations of images. *Clarification 2:* Lines of reflection are limited to the x-axis, y-axis or lines parallel to the axes. *Clarification 3:* Rotations must be about the origin and are limited to 90°, 180°, 270° or 360°. *Clarification 4:* Dilations must be centered at the origin.
MA.8.GR.2.4:	Solve mathematical and real-world problems involving proportional relationships between similar triangles.
MA.8.NSO.1.1:	Extend previous understanding of rational numbers to define irrational numbers within the real number system. Locate an approximate value of a numerical expression involving irrational numbers on a number line. **Clarifications:** *Clarification 1:* Instruction includes the use of number line and rational number approximations, and recognizing pi (π) as an irrational number. *Clarification 2:* Within this benchmark, the expectation is to approximate numerical expressions involving one arithmetic operation and estimating square roots or pi (π).
MA.8.NSO.1.2:	Plot, order and compare rational and irrational numbers, represented in various forms. **Clarifications:** *Clarification 1:* Within this benchmark, it is not the expectation to work with the number e. *Clarification 2:* Within this benchmark, the expectation is to plot, order and compare square roots and cube roots. *Clarification 3:* Within this benchmark, the expectation is to use symbols (<, > or =).
MA.8.NSO.1.3:	Extend previous understanding of the Laws of Exponents to include integer exponents. Apply the Laws of Exponents to evaluate numerical expressions and generate equivalent numerical expressions, limited to integer exponents and rational number bases, with procedural fluency. **Clarifications:** *Clarification 1:* Refer to the K-12 Formulas (Appendix E) for the Laws of Exponents.
MA.8.NSO.1.4:	Express numbers in scientific notation to represent and approximate very large or very small quantities. Determine how many times larger or smaller one number is compared to a second number.
MA.8.NSO.1.5:	Add, subtract, multiply and divide numbers expressed in scientific notation with procedural fluency. **Clarifications:** *Clarification 1:* Within this benchmark, for addition and subtraction with numbers expressed in scientific notation, exponents are limited to within 2 of each other.
MA.8.NSO.1.6:	Solve real-world problems involving operations with numbers expressed in scientific notation. **Clarifications:** *Clarification 1:* Instruction includes recognizing the importance of significant digits when physical measurements are involved. *Clarification 2:* Within this benchmark, for addition and subtraction with numbers expressed in scientific notation, exponents are limited to within 2 of each other.

<table>
<tr><td>MA.8.NSO.1.7:</td><td>Solve multi-step mathematical and real-world problems involving the order of operations with rational numbers including exponents and radicals.
Clarifications:
Clarification 1: Multi-step expressions are limited to 6 or fewer steps.
Clarification 2: Within this benchmark, the expectation is to simplify radicals by factoring square roots of perfect squares up to 225 and cube roots of perfect cubes from -125 to 125.</td></tr>
<tr><td>MA.K12.MTR.1.1:</td><td>Mathematicians who participate in effortful learning both individually and with others:
Analyze the problem in a way that makes sense given the task.
Ask questions that will help with solving the task.
Build perseverance by modifying methods as needed while solving a challenging task.
Stay engaged and maintain a positive mindset when working to solve tasks.
Help and support each other when attempting a new method or approach.
Clarifications:
Teachers who encourage students to participate actively in effortful learning both individually and with others:
Cultivate a community of growth mindset learners.
Foster perseverance in students by choosing tasks that are challenging.
Develop students’ ability to analyze and problem solve.
Recognize students’ effort when solving challenging problems.</td></tr>
<tr><td>MA.K12.MTR.2.1:</td><td>Demonstrate understanding by representing problems in multiple ways.
Mathematicians who demonstrate understanding by representing problems in multiple ways:
Build understanding through modeling and using manipulatives.
Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.
Progress from modeling problems with objects and drawings to using algorithms and equations.
Express connections between concepts and representations.
Choose a representation based on the given context or purpose.
Clarifications:
Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:
Help students make connections between concepts and representations.
Provide opportunities for students to use manipulatives when investigating concepts.
Guide students from concrete to pictorial to abstract representations as understanding progresses.
Show students that various representations can have different purposes and can be useful in different situations.</td></tr>
<tr><td>MA.K12.MTR.3.1:</td><td>Complete tasks with mathematical fluency.
Mathematicians who complete tasks with mathematical fluency:
Select efficient and appropriate methods for solving problems within the given context.
Maintain flexibility and accuracy while performing procedures and mental calculations.
Complete tasks accurately and with confidence.
Adapt procedures to apply them to a new context.
Use feedback to improve efficiency when performing calculations.
Clarifications:
Teachers who encourage students to complete tasks with mathematical fluency:
Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.
Offer multiple opportunities for students to practice efficient and generalizable methods.
Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.</td></tr>
<tr><td>MA.K12.MTR.4.1:</td><td>Engage in discussions that reflect on the mathematical thinking of self and others.
Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:
Communicate mathematical ideas, vocabulary and methods effectively.
Analyze the mathematical thinking of others.
Compare the efficiency of a method to those expressed by others.
Recognize errors and suggest how to correctly solve the task.
Justify results by explaining methods and processes.
Construct possible arguments based on evidence.
Clarifications:
Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others:
Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning.
Create opportunities for students to discuss their thinking with peers.
Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods.
Develop students’ ability to justify methods and compare their responses to the responses of their peers.</td></tr>
<tr><td>MA.K12.MTR.5.1:</td><td>Use patterns and structure to help understand and connect mathematical concepts.
Mathematicians who use patterns and structure to help understand and connect mathematical concepts:
Focus on relevant details within a problem.
Create plans and procedures to logically order events, steps or ideas to solve problems.
Decompose a complex problem into manageable parts.
Relate previously learned concepts to new concepts.
Look for similarities among problems.
Connect solutions of problems to more complicated large-scale situations.
Clarifications:</td></tr>
</table>

	Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. **Clarifications:** Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems. • Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. **Clarifications:** Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. **Clarifications:** K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. **Clarifications:** See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. **Clarifications:** Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. **Clarifications:** In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think _______ because ______." The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. **Clarifications:** Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. **Clarifications:** In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends

	differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

General Course Information and Notes

VERSION DESCRIPTION

This course supports students who need additional instruction in foundational mathematics skills as it relates to core instruction. Instruction will use explicit, systematic, and sequential approaches to mathematics instruction addressing all strands including number sense & operations, algebraic reasoning, functions, geometric reasoning and data analysis & probability. Teachers will use the listed benchmarks that correspond to each students' needs.

Effective instruction matches instruction to the need of the students in the group and provides multiple opportunities to practice the skill and receive feedback. The additional time allotted for this course is in addition to core instruction. The intervention includes materials and strategies designed to supplement core instruction.

GENERAL NOTES

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards
This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:
https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Number: 1204000

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 6 to 8 Education Courses > **Subject:** Mathematics > **SubSubject:** Remedial Mathematics >

Abbreviated Title: M/J FDNSKLS MATH 6-8

Course Length: Multiple (M) - Course length can vary

Course Attributes:

- Class Size Core Required

Course Type: Elective Course

Course Level: 1

Course Status: State Board Approved

Grade Level(s): 6,7,8

Educator Certifications

Mathematics (Grades 6-12)
Middle Grades Mathematics (Middle Grades 5-9)
Middle Grades Integrated Curriculum (Middle Grades 5-9)

M/J Grade 6 Mathematics (#1205010) 2015 - 2022 (current)

Course Standards

Name	Description
MAFS.6.EE.1.1:	Write and evaluate numerical expressions involving whole-number exponents.
MAFS.6.EE.1.2:	Write, read, and evaluate expressions in which letters stand for numbers. a. Write expressions that record operations with numbers and with letters standing for numbers. *For example, express the calculation "Subtract y from 5" as 5 – y.* b. Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. *For example, describe the expression 2 (8 + 7) as a product of two factors; view (8 + 7) as both a single entity and a sum of two terms.* c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). *For example, use the formulas $V = s^3$ and $A = 6\ s^2$ to find the volume and surface area of a cube with sides of length s = 1/2.*
MAFS.6.EE.1.3:	Apply the properties of operations to generate equivalent expressions. *For example, apply the distributive property to the expression 3 (2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6 (4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y.* **Clarifications:** **Examples of Opportunities for In-Depth Focus** By applying properties of operations to generate equivalent expressions, students use properties of operations that they are familiar with from previous grades' work with numbers — generalizing arithmetic in the process.
MAFS.6.EE.1.4:	Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). *For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for.*
MAFS.6.EE.2.5:	Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.
MAFS.6.EE.2.6:	Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.
MAFS.6.EE.2.7:	Solve real-world and mathematical problems by writing and solving equations of the form x + p = q and px = q for cases in which p, q and x are all non-negative rational numbers. **Clarifications:** **Examples of Opportunities for In-Depth Focus** When students write equations of the form x + p = q and px = q to solve real-world and mathematical problems, they draw on meanings of operations that they are familiar with from previous grades' work. They also begin to learn algebraic approaches to solving problems.[16] [16] For example, suppose Daniel went to visit his grandmother, who gave him \$5.50. Then he bought a book costing \$9.20 and had \$2.30 left. To find how much money he had before visiting his grandmother, an algebraic approach leads to the equation x + 5.50 – 9.20 = 2.30. An arithmetic approach without using variables at all would be to begin with 2.30, then add 9.20, then subtract 5.50. This yields the desired answer, but students will eventually encounter problems in which arithmetic approaches are unrealistically difficult and algebraic approaches must be used.
MAFS.6.EE.2.8:	Write an inequality of the form x > c or x < c to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form x > c or x < c have infinitely many solutions; represent solutions of such inequalities on number line diagrams.
MAFS.6.EE.3.9:	Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. *For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time.*
MAFS.6.G.1.1:	Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.
MAFS.6.G.1.2:	Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas *V = l w h* and *V = B h* to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.
MAFS.6.G.1.3:	Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.
MAFS.6.G.1.4:	Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.
	Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, create a story context for (2/3) ÷ (3/4) and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that (2/3) ÷ (3/4) = 8/9 because 3/4 of 8/9 is 2/3. (In general, (a/b) ÷ (c/d) = ad/bc.) How much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 3/4-cup servings are in 2/3 of a cup of yogurt? How wide is a rectangular strip of land with length 3/4 mi and area 1/2 square mi?* **Clarifications:**

MAFS.6.NS.1.1:	**Examples of Opportunities for In-Depth Focus** This is a culminating standard for extending multiplication and division to fractions. **Fluency Expectations or Examples of Culminating Standards** Students interpret and compute quotients of fractions and solve word problems involving division of fractions by fractions. This completes the extension of operations to fractions.
MAFS.6.NS.2.2:	Fluently divide multi-digit numbers using the standard algorithm. **Clarifications:** **Fluency Expectations or Examples of Culminating Standards** Students fluently divide multi-digit numbers using the standard algorithm. This is the culminating standard for several years' worth of work with division of whole numbers.
MAFS.6.NS.2.3:	Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation. **Clarifications:** **Fluency Expectations or Examples of Culminating Standards** Students fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation. This is the culminating standard for several years' worth of work relating to the domains of Number and Operations in Base Ten, Operations and Algebraic Thinking, and Number and Operations — Fractions.
MAFS.6.NS.2.4:	Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor. *For example, express 36 + 8 as 4 (9 + 2).*
MAFS.6.NS.3.5:	Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.
MAFS.6.NS.3.6:	Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates. a. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., –(–3) = 3, and that 0 is its own opposite. b. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes. c. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.
MAFS.6.NS.3.7:	Understand ordering and absolute value of rational numbers. a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. *For example, interpret -3 > -7 as a statement that -3 is located to the right of -7 on a number line oriented from left to right.* b. Write, interpret, and explain statements of order for rational numbers in real-world contexts. *For example, write -3 ºC > -7 ºC to express the fact that -3 ºC is warmer than -7 ºC.* c. Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. *For example, for an account balance of -30 dollars, write |-30| = 30 to describe the size of the debt in dollars.* d. Distinguish comparisons of absolute value from statements about order. *For example, recognize that an account balance less than -30 dollars represents a debt greater than 30 dollars.*
MAFS.6.NS.3.8:	Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate. **Clarifications:** **Examples of Opportunities for In-Depth Focus** When students work with rational numbers in the coordinate plane to solve problems, they combine and consolidate elements from the other standards in this cluster.
MAFS.6.RP.1.1:	Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. *For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."*
MAFS.6.RP.1.2:	Understand the concept of a unit rate a/b associated with a ratio a:b with b ≠ 0, and use rate language in the context of a ratio relationship. *For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger."*
	Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. a. Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios. b. Solve unit rate problems including those involving unit pricing and constant speed. *For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?*

MAFS.6.RP.1.3:	c. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent. d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities. e. Understand the concept of Pi as the ratio of the circumference of a circle to its diameter. ([1]See Table 2 Common Multiplication and Division Situations) **Clarifications:** **Examples of Opportunities for In-Depth Focus** When students work toward meeting this standard, they use a range of reasoning and representations to analyze proportional relationships.
MAFS.6.SP.1.1:	Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. *For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.*
MAFS.6.SP.1.2:	Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.
MAFS.6.SP.1.3:	Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.
MAFS.6.SP.2.4:	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
MAFS.6.SP.2.5:	Summarize numerical data sets in relation to their context, such as by: a. Reporting the number of observations. b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.
MAFS.K12.MP.1.1:	**Make sense of problems and persevere in solving them.** Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
MAFS.K12.MP.2.1:	**Reason abstractly and quantitatively**. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
MAFS.K12.MP.3.1:	**Construct viable arguments and critique the reasoning of others.** Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
MAFS.K12.MP.4.1:	**Model with mathematics.** Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
MAFS.K12.MP.5.1:	**Use appropriate tools strategically.** Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying

	assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
MAFS.K12.MP.6.1:	**Attend to precision.** Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
MAFS.K12.MP.7.1:	**Look for and make use of structure.** Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
MAFS.K12.MP.8.1:	**Look for and express regularity in repeated reasoning.** Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
LAFS.6.SL.1.1:	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly. a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion. b. Follow rules for collegial discussions, set specific goals and deadlines, and define individual roles as needed. c. Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under discussion. d. Review the key ideas expressed and demonstrate understanding of multiple perspectives through reflection and paraphrasing.
LAFS.6.SL.1.2:	Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.
LAFS.6.SL.1.3:	Delineate a speaker's argument and specific claims, distinguishing claims that are supported by reasons and evidence from claims that are not.
LAFS.6.SL.2.4:	Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.
LAFS.68.RST.1.3:	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
LAFS.68.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.
LAFS.68.RST.3.7:	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
LAFS.68.WHST.1.1:	Write arguments focused on *discipline-specific content*. a. Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically. b. Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources. c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence. d. Establish and maintain a formal style. e. Provide a concluding statement or section that follows from and supports the argument presented.
LAFS.68.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

GENERAL NOTES

MAFS.6

In Grade 6, instructional time should focus on four critical areas: (1) connecting ratio and rate to whole number multiplication and division and using concepts of ratio and rate to solve problems; (2) completing understanding of division of fractions and extending the notion of number to the system of rational numbers, which includes negative numbers; (3) writing, interpreting, and using expressions and equations; and (4) developing understanding of statistical thinking.

1. Students use reasoning about multiplication and division to solve ratio and rate problems about quantities. By viewing equivalent ratios and rates as deriving from,

and extending, pairs of rows (or columns) in the multiplication table, and by analyzing simple drawings that indicate the relative size of quantities, students connect their understanding of multiplication and division with ratios and rates. Thus students expand the scope of problems for which they can use multiplication and division to solve problems, and they connect ratios and fractions. Students solve a wide variety of problems involving ratios and rates.

2. Students use the meaning of fractions, the meanings of multiplication and division, and the relationship between multiplication and division to understand and explain why the procedures for dividing fractions make sense. Students use these operations to solve problems. Students extend their previous understandings of number and the ordering of numbers to the full system of rational numbers, which includes negative rational numbers, and in particular negative integers. They reason about the order and absolute value of rational numbers and about the location of points in all four quadrants of the coordinate plane.
3. Students understand the use of variables in mathematical expressions. They write expressions and equations that correspond to given situations, evaluate expressions, and use expressions and formulas to solve problems. Students understand that expressions in different forms can be equivalent, and they use the properties of operations to rewrite expressions in equivalent forms. Students know that the solutions of an equation are the values of the variables that make the equation true. Students use properties of operations and the idea of maintaining the equality of both sides of an equation to solve simple one-step equations. Students construct and analyze tables, such as tables of quantities that are equivalent ratios, and they use equations (such as $3x = y$) to describe relationships between quantities.
4. Building on and reinforcing their understanding of number, students begin to develop their ability to think statistically. Students recognize that a data distribution may not have a definite center and that different ways to measure center yield different values. The median measures center in the sense that it is roughly the middle value. The mean measures center in the sense that it is the value that each data point would take on if the total of the data values were redistributed equally, and also in the sense that it is a balance point. Students recognize that a measure of variability (interquartile range or mean absolute deviation) can also be useful for summarizing data because two very different set of data can have the same mean and median yet be distinguished by their variability. Students learn to describe and summarize numerical data sets, identifying clusters, peaks, gaps, and symmetry, considering the context in which the data were collected.

Students in Grade 6 also build on their work with area in elementary school by reasoning about relationships among shapes to determine area, surface area, and volume. They find areas of right triangles, other triangles, and special quadrilaterals by decomposing these shapes, rearranging or removing pieces, and relating the shapes to rectangles. Using these methods, students discuss, develop, and justify formulas for areas of triangles and parallelograms. Students find areas of polygons and surface areas of prisms and pyramids by decomposing them into pieces whose area they can determine. They reason about right rectangular prisms with fractional side lengths to extend formulas for the volume of a right rectangular prism to fractional side lengths. They prepare for work on scale drawings and constructions in Grade 7 by drawing polygons in the coordinate plane.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

Additional Instructional Resources:
A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGI/cms/review.html?Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

Florida Standards Implementation Guide Focus Section:

The Mathematics Florida Standards Implementation Guide was created to support the teaching and learning of the Mathematics Florida Standards. The guide is compartmentalized into three components: focus, coherence, and rigor.Focus means narrowing the scope of content in each grade or course, so students achieve higher levels of understanding and experience math concepts more deeply. The Mathematics standards allow for the teaching and learning of mathematical concepts focused around major clusters at each grade level, enhanced by supporting and additional clusters. The major, supporting and additional clusters are identified, in relation to each grade or course. The cluster designations for this course are below.

Major Clusters

MAFS.6.RP.1 Understand ratio concepts and use ratio reasoning to solve problems.

MAFS.6.NS.1 Apply and extend previous understandings of multiplication and division to divide fractions.

MAFS.6.NS.3 Apply and extend previous understandings of numbers to the system of rational numbers.

MAFS.6.EE.1 Apply and extend previous understanding of arithmetic to algebraic expressions.

MAFS.6.EE.2 Reason about and solve one-step equations and inequalities.

MAFS.6.EE.3 Represent and analyze quantitative relationships between dependent and independent variables.

Supporting Clusters

MAFS.6.G.1 Solve real-world and mathematical problems involving area, surface area, and volume.

Additional Clusters

MAFS.6.NS.2 Compute fluently with multi-digit numbers and find common factors and multiples.

MAFS.6.SP.1 Develop understanding of statistical variability.

MAFS.6.SP.2 Summarize and describe distributions.

Note: Clusters should not be sorted from major to supporting and then taught in that order. To do so would strip the coherence of the mathematical ideas and miss the opportunity to enhance the major work of the grade with the supporting and additional clusters.

GENERAL INFORMATION

Course Number: 1205010

Course Path: **Section:** Grades PreK to 12 Education Courses > **Grade Group:** Grades 6 to 8 Education Courses > **Subject:** Mathematics > **SubSubject:** General Mathematics >

Abbreviated Title: M/J GRADE 6 MATH

Course Length: Year (Y)

Course Attributes:

- Class Size Core Required

Course Type: Core Academic Course

Course Level: 2

Course Status: Course Approved

Grade Level(s): 6,7,8

Educator Certifications

Mathematics (Elementary Grades 1-6)
Middle Grades Mathematics (Middle Grades 5-9)
Middle Grades Integrated Curriculum (Middle Grades 5-9)
Mathematics (Grades 6-12)
Elementary Education (Grades K-6)
Elementary Education (Elementary Grades 1-6)

M/J Grade 6 Mathematics (#1205010) 2022 - And Beyond

Course Standards

Name	Description
MA.6.AR.1.1:	Given a mathematical or real-world context, translate written descriptions into algebraic expressions and translate algebraic expressions into written descriptions.
MA.6.AR.1.2:	Translate a real-world written description into an algebraic inequality in the form of $x > a$, $x < a$, $x \geq a$ or $x \leq a$. Represent the inequality on a number line. **Clarifications:** *Clarification 1:* Variables may be on the left or right side of the inequality symbol.
MA.6.AR.1.3:	Evaluate algebraic expressions using substitution and order of operations. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is to perform all operations with integers. *Clarification 2:* Refer to Properties of Operations, Equality and Inequality (Appendix D).
MA.6.AR.1.4:	Apply the properties of operations to generate equivalent algebraic expressions with integer coefficients. **Clarifications:** *Clarification 1:* Properties include associative, commutative and distributive. *Clarification 2:* Refer to Properties of Operations, Equality and Inequality (Appendix D).
MA.6.AR.2.1:	Given an equation or inequality and a specified set of integer values, determine which values make the equation or inequality true or false. **Clarifications:** *Clarification 1:* Problems include the variable in multiple terms or on either side of the equal sign or inequality symbol.
MA.6.AR.2.2:	Write and solve one-step equations in one variable within a mathematical or real-world context using addition and subtraction, where all terms and solutions are integers. **Clarifications:** *Clarification 1:* Instruction includes using manipulatives, drawings, number lines and inverse operations. *Clarification 2:* Instruction includes equations in the forms $x+p=q$ and $p+x=q$, where x,p and q are any integer. *Clarification 3:* Problems include equations where the variable may be on either side of the equal sign.
MA.6.AR.2.3:	Write and solve one-step equations in one variable within a mathematical or real-world context using multiplication and division, where all terms and solutions are integers. **Clarifications:** *Clarification 1:* Instruction includes using manipulatives, drawings, number lines and inverse operations. *Clarification 2:* Instruction includes equations in the forms $\frac{x}{p} = q$, where $p \neq 0$, and $px=q$. *Clarification 3:* Problems include equations where the variable may be on either side of the equal sign.
MA.6.AR.2.4:	Determine the unknown decimal or fraction in an equation involving any of the four operations, relating three numbers, with the unknown in any position. **Clarifications:** *Clarification 1:* Instruction focuses on using algebraic reasoning, drawings, and mental math to determine unknowns. *Clarification 2:* Problems include the unknown and different operations on either side of the equal sign. All terms and solutions are limited to positive rational numbers.
MA.6.AR.3.1:	Given a real-world context, write and interpret ratios to show the relative sizes of two quantities using appropriate notation: , a to b, or a:b where $b \neq 0$. **Clarifications:** *Clarification 1:* Instruction focuses on the understanding that a ratio can be described as a comparison of two quantities in either the same or different units. *Clarification 2:* Instruction includes using manipulatives, drawings, models and words to interpret part-to-part ratios and part-to-whole ratios. *Clarification 3:* The values of a and b are limited to whole numbers.
MA.6.AR.3.2:	Given a real-world context, determine a rate for a ratio of quantities with different units. Calculate and interpret the corresponding unit rate. **Clarifications:** *Clarification 1:* Instruction includes using manipulatives, drawings, models and words and making connections between ratios, rates and unit rates. *Clarification 2:* Problems will not include conversions between customary and metric systems.
MA.6.AR.3.3:	Extend previous understanding of fractions and numerical patterns to generate or complete a two- or three-column table to display equivalent part-to-part ratios and part-to-part-to-whole ratios. **Clarifications:** *Clarification 1:* Instruction includes using two-column tables (e.g., a relationship between two variables) and three-column tables (e.g., part-to-

	part-to-whole relationship) to generate conversion charts and mixture charts.
MA.6.AR.3.4:	Apply ratio relationships to solve mathematical and real-world problems involving percentages using the relationship between two quantities. **Clarifications:** *Clarification 1:* Instruction includes the comparison of $\frac{part}{whole}$ to $\frac{percent}{100}$ in order to determine the percent, the part or the whole.
MA.6.AR.3.5:	Solve mathematical and real-world problems involving ratios, rates and unit rates, including comparisons, mixtures, ratios of lengths and conversions within the same measurement system. **Clarifications:** *Clarification 1:* Instruction includes the use of tables, tape diagrams and number lines.
MA.6.DP.1.1:	Recognize and formulate a statistical question that would generate numerical data.
MA.6.DP.1.2:	Given a numerical data set within a real-world context, find and interpret mean, median, mode and range. **Clarifications:** *Clarification 1:* Numerical data is limited to positive rational numbers.
MA.6.DP.1.3:	Given a box plot within a real-world context, determine the minimum, the lower quartile, the median, the upper quartile and the maximum. Use this summary of the data to describe the spread and distribution of the data. **Clarifications:** *Clarification 1:* Instruction includes describing range, interquartile range, halves and quarters of the data.
MA.6.DP.1.4:	Given a histogram or line plot within a real-world context, qualitatively describe and interpret the spread and distribution of the data, including any symmetry, skewness, gaps, clusters, outliers and the range. **Clarifications:** *Clarification 1:* Refer to K-12 Mathematics Glossary (Appendix C).
MA.6.DP.1.5:	Create box plots and histograms to represent sets of numerical data within real-world contexts. **Clarifications:** *Clarification 1:* Instruction includes collecting data and discussing ways to collect truthful data to construct graphical representations. *Clarification 2:* Within this benchmark, it is the expectation to use appropriate titles, labels, scales and units when constructing graphical representations. *Clarification 3:* Numerical data is limited to positive rational numbers.
MA.6.DP.1.6:	Given a real-world scenario, determine and describe how changes in data values impact measures of center and variation. **Clarifications:** *Clarification 1:* Instruction includes choosing the measure of center or measure of variation depending on the scenario. *Clarification 2:* The measures of center are limited to mean and median. The measures of variation are limited to range and interquartile range. *Clarification 3:* Numerical data is limited to positive rational numbers.
MA.6.GR.1.1:	Extend previous understanding of the coordinate plane to plot rational number ordered pairs in all four quadrants and on both axes. Identify the x- or y-axis as the line of reflection when two ordered pairs have an opposite x- or y-coordinate.
MA.6.GR.1.2:	Find distances between ordered pairs, limited to the same x-coordinate or the same y-coordinate, represented on the coordinate plane.
MA.6.GR.1.3:	Solve mathematical and real-world problems by plotting points on a coordinate plane, including finding the perimeter or area of a rectangle. **Clarifications:** *Clarification 1:* Instruction includes finding distances between points, computing dimensions of a rectangle or determining a fourth vertex of a rectangle. *Clarification 2:* Problems involving rectangles are limited to cases where the sides are parallel to the axes.
MA.6.GR.2.1:	Derive a formula for the area of a right triangle using a rectangle. Apply a formula to find the area of a triangle. **Clarifications:** *Clarification 1:* Instruction focuses on the relationship between the area of a rectangle and the area of a right triangle. *Clarification 2:* Within this benchmark, the expectation is to know from memory a formula for the area of a triangle.
MA.6.GR.2.2:	Solve mathematical and real-world problems involving the area of quadrilaterals and composite figures by decomposing them into triangles or rectangles. **Clarifications:** *Clarification 1:* Problem types include finding area of composite shapes and determining missing dimensions. *Clarification 2:* Within this benchmark, the expectation is to know from memory a formula for the area of a rectangle and triangle. *Clarification 3:* Dimensions are limited to positive rational numbers.
MA.6.GR.2.3:	Solve mathematical and real-world problems involving the volume of right rectangular prisms with positive rational number edge lengths using a visual model and a formula. **Clarifications:** *Clarification 1:* Problem types include finding the volume or a missing dimension of a rectangular prism.
MA.6.GR.2.4:	Given a mathematical or real-world context, find the surface area of right rectangular prisms and right rectangular pyramids using the figure's net. **Clarifications:** *Clarification 1:* Instruction focuses on representing a right rectangular prism and right rectangular pyramid with its net and on the connection between the surface area of a figure and its net. *Clarification 2:* Within this benchmark, the expectation is to find the surface area when given a net or when given a three-dimensional figure. *Clarification 3:* Problems involving right rectangular pyramids are limited to cases where the heights of triangles are given. *Clarification 4:* Dimensions are limited to positive rational numbers.

MA.6.NSO.1.1:	Extend previous understanding of numbers to define rational numbers. Plot, order and compare rational numbers. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is to plot, order and compare positive and negative rational numbers when given in the same form and to plot, order and compare positive rational numbers when given in different forms (fraction, decimal, percentage). *Clarification 2:* Within this benchmark, the expectation is to use symbols (<, > or =).
MA.6.NSO.1.2:	Given a mathematical or real-world context, represent quantities that have opposite direction using rational numbers. Compare them on a number line and explain the meaning of zero within its context. **Clarifications:** *Clarification 1:* Instruction includes vertical and horizontal number lines, context referring to distances, temperatures and finances and using informal verbal comparisons, such as, lower, warmer or more in debt. *Clarification 2:* Within this benchmark, the expectation is to compare positive and negative rational numbers when given in the same form.
MA.6.NSO.1.3:	Given a mathematical or real-world context, interpret the absolute value of a number as the distance from zero on a number line. Find the absolute value of rational numbers. **Clarifications:** *Clarification 1:* Instruction includes the connection of absolute value to mirror images about zero and to opposites. *Clarification 2:* Instruction includes vertical and horizontal number lines and context referring to distances, temperature and finances.
MA.6.NSO.1.4:	Solve mathematical and real-world problems involving absolute value, including the comparison of absolute value. **Clarifications:** *Clarification 1:* Absolute value situations include distances, temperatures and finances. *Clarification 2:* Problems involving calculations with absolute value are limited to two or fewer operations. *Clarification 3:* Within this benchmark, the expectation is to use integers only.
MA.6.NSO.2.1:	Multiply and divide positive multi-digit numbers with decimals to the thousandths, including using a standard algorithm with procedural fluency. **Clarifications:** *Clarification 1:* Multi-digit decimals are limited to no more than 5 total digits.
MA.6.NSO.2.2:	Extend previous understanding of multiplication and division to compute products and quotients of positive fractions by positive fractions, including mixed numbers, with procedural fluency. **Clarifications:** *Clarification 1:* Instruction focuses on making connections between visual models, the relationship between multiplication and division, reciprocals and algorithms.
MA.6.NSO.2.3:	Solve multi-step real-world problems involving any of the four operations with positive multi-digit decimals or positive fractions, including mixed numbers. **Clarifications:** *Clarification 1:* Within this benchmark, it is not the expectation to include both decimals and fractions within a single problem.
MA.6.NSO.3.1:	Given a mathematical or real-world context, find the greatest common factor and least common multiple of two whole numbers. **Clarifications:** *Clarification 1:* Within this benchmark, expectations include finding greatest common factor within 1,000 and least common multiple with factors to 25. *Clarification 2*: Instruction includes finding the greatest common factor of the numerator and denominator of a fraction to simplify a fraction.
MA.6.NSO.3.2:	Rewrite the sum of two composite whole numbers having a common factor, as a common factor multiplied by the sum of two whole numbers. **Clarifications:** *Clarification 1:* Instruction includes using the distributive property to generate equivalent expressions.
MA.6.NSO.3.3:	Evaluate positive rational numbers and integers with natural number exponents. **Clarifications:** *Clarification 1:* Within this benchmark, expectations include using natural number exponents up to 5.
MA.6.NSO.3.4:	Express composite whole numbers as a product of prime factors with natural number exponents.
MA.6.NSO.3.5:	Rewrite positive rational numbers in different but equivalent forms including fractions, terminating decimals and percentages. **Clarifications:** *Clarification 1:* Rational numbers include decimal equivalence up to the thousandths place.
MA.6.NSO.4.1:	Apply and extend previous understandings of operations with whole numbers to add and subtract integers with procedural fluency. **Clarifications:** *Clarification 1:* Instruction begins with the use of manipulatives, models and number lines working towards becoming procedurally fluent by the end of grade 6. *Clarification 2:* Instruction focuses on the inverse relationship between the operations of addition and subtraction. If p and q are integers, then p-q=p+(-q) and p+q=p-(-q).
MA.6.NSO.4.2:	Apply and extend previous understandings of operations with whole numbers to multiply and divide integers with procedural fluency. **Clarifications:** *Clarification 1:* Instruction includes the use of models and number lines and the inverse relationship between multiplication and division, working towards becoming procedurally fluent by the end of grade 6. *Clarification 2:* Instruction focuses on the understanding that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers where q≠0, then $-\left(\frac{p}{q}\right)=\frac{-p}{q}$, $-\left(\frac{p}{q}\right)=\frac{p}{-q}$ and $\frac{p}{q}=\frac{-p}{-q}$.
	Mathematicians who participate in effortful learning both individually and with others:

MA.K12.MTR.1.1:	• Analyze the problem in a way that makes sense given the task. • Ask questions that will help with solving the task. • Build perseverance by modifying methods as needed while solving a challenging task. • Stay engaged and maintain a positive mindset when working to solve tasks. • Help and support each other when attempting a new method or approach. **Clarifications:** Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: • Build understanding through modeling and using manipulatives. • Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. • Progress from modeling problems with objects and drawings to using algorithms and equations. • Express connections between concepts and representations. • Choose a representation based on the given context or purpose. **Clarifications:** Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations. **Clarifications:** Teachers who encourage students to complete tasks with mathematical fluency: • Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. • Offer multiple opportunities for students to practice efficient and generalizable methods. • Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: • Communicate mathematical ideas, vocabulary and methods effectively. • Analyze the mathematical thinking of others. • Compare the efficiency of a method to those expressed by others. • Recognize errors and suggest how to correctly solve the task. • Justify results by explaining methods and processes. • Construct possible arguments based on evidence. **Clarifications:** Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. **Clarifications:** Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:

MA.K12.MTR.6.1:	• Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. **Clarifications:** Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems. • Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. **Clarifications:** Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. **Clarifications:** K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. **Clarifications:** See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. **Clarifications:** Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. **Clarifications:** In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think _______ because ______." The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. **Clarifications:** Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. **Clarifications:** In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

VERSION DESCRIPTION

The benchmarks in this course are mastery goals that students are expected to attain by the end of the year. To build mastery, students will continue to review and apply earlier grade-level benchmarks and expectations.

GENERAL NOTES

In grade 6, instructional time will emphasize five areas: (1) performing all four operations with integers, positive decimals and positive fractions with procedural fluency; (2) exploring and applying concepts of ratios, rates and percent to solve problems; (3) creating, interpreting and using expressions and equations; (4) extending geometric reasoning to plotting points on the coordinate plane, area and volume of geometric figures and (5) extending understanding of statistical thinking.

Curricular content for all subjects must integrate critical-thinking, problem-solving, and workforce-literacy skills; communication, reading, and writing skills; mathematics skills; collaboration skills; contextual and applied-learning skills; technology-literacy skills; information and media-literacy skills; and civic-engagement skills.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:
https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Number: 1205010

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 6 to 8 Education Courses > **Subject:** Mathematics > **SubSubject:** General Mathematics >

Abbreviated Title: M/J GRADE 6 MATH

Course Length: Year (Y)

Course Type: Core Academic Course

Course Level: 2

Course Status: State Board Approved

Educator Certifications

Mathematics (Elementary Grades 1-6)
Middle Grades Mathematics (Middle Grades 5-9)
Middle Grades Integrated Curriculum (Middle Grades 5-9)
Mathematics (Grades 6-12)
Elementary Education (Grades K-6)
Elementary Education (Elementary Grades 1-6)

M/J Accelerated Mathematics Grade 6 (#1205020) 2020 - 2022 (current)

Course Standards

Name	Description
MAFS.6.EE.1.1:	Write and evaluate numerical expressions involving whole-number exponents.
MAFS.6.EE.1.2:	Write, read, and evaluate expressions in which letters stand for numbers. a. Write expressions that record operations with numbers and with letters standing for numbers. *For example, express the calculation "Subtract y from 5" as 5 – y.* b. Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. *For example, describe the expression 2 (8 + 7) as a product of two factors; view (8 + 7) as both a single entity and a sum of two terms.* c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). *For example, use the formulas $V = s^3$ and $A = 6 s^2$ to find the volume and surface area of a cube with sides of length s = 1/2.*
MAFS.6.EE.1.3:	Apply the properties of operations to generate equivalent expressions. *For example, apply the distributive property to the expression 3 (2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6 (4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y.* **Clarifications:** **Examples of Opportunities for In-Depth Focus** By applying properties of operations to generate equivalent expressions, students use properties of operations that they are familiar with from previous grades' work with numbers — generalizing arithmetic in the process.
MAFS.6.EE.1.4:	Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). *For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for.*
MAFS.6.EE.2.5:	Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.
MAFS.6.EE.2.6:	Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.
MAFS.6.EE.2.7:	Solve real-world and mathematical problems by writing and solving equations of the form x + p = q and px = q for cases in which p, q and x are all non-negative rational numbers. **Clarifications:** **Examples of Opportunities for In-Depth Focus** When students write equations of the form x + p = q and px = q to solve real-world and mathematical problems, they draw on meanings of operations that they are familiar with from previous grades' work. They also begin to learn algebraic approaches to solving problems.[16] [16] For example, suppose Daniel went to visit his grandmother, who gave him \$5.50. Then he bought a book costing \$9.20 and had \$2.30 left. To find how much money he had before visiting his grandmother, an algebraic approach leads to the equation x + 5.50 – 9.20 = 2.30. An arithmetic approach without using variables at all would be to begin with 2.30, then add 9.20, then subtract 5.50. This yields the desired answer, but students will eventually encounter problems in which arithmetic approaches are unrealistically difficult and algebraic approaches must be used.
MAFS.6.EE.2.8:	Write an inequality of the form x > c or x < c to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form x > c or x < c have infinitely many solutions; represent solutions of such inequalities on number line diagrams.
MAFS.6.EE.3.9:	Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. *For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time.*
MAFS.6.G.1.1:	Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.
MAFS.6.G.1.2:	Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas *V = l w h* and *V = B h* to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.
MAFS.6.G.1.3:	Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.
MAFS.6.G.1.4:	Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.
	Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, create a story context for (2/3) ÷ (3/4) and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that (2/3) ÷ (3/4) = 8/9 because 3/4 of 8/9 is 2/3. (In general, (a/b) ÷ (c/d) = ad/bc.) How much*

	chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 3/4-cup servings are in 2/3 of a cup of yogurt? How wide is a rectangular strip of land with length 3/4 mi and area 1/2 square mi?
MAFS.6.NS.1.1:	**Clarifications:** **Examples of Opportunities for In-Depth Focus** This is a culminating standard for extending multiplication and division to fractions. **Fluency Expectations or Examples of Culminating Standards** Students interpret and compute quotients of fractions and solve word problems involving division of fractions by fractions. This completes the extension of operations to fractions.
MAFS.6.NS.2.2:	Fluently divide multi-digit numbers using the standard algorithm. **Clarifications:** **Fluency Expectations or Examples of Culminating Standards** Students fluently divide multi-digit numbers using the standard algorithm. This is the culminating standard for several years' worth of work with division of whole numbers.
MAFS.6.NS.2.3:	Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation. **Clarifications:** **Fluency Expectations or Examples of Culminating Standards** Students fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation. This is the culminating standard for several years' worth of work relating to the domains of Number and Operations in Base Ten, Operations and Algebraic Thinking, and Number and Operations — Fractions.
MAFS.6.NS.2.4:	Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor. *For example, express 36 + 8 as 4 (9 + 2).*
MAFS.6.NS.3.5:	Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.
MAFS.6.NS.3.6:	Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates. a. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., –(–3) = 3, and that 0 is its own opposite. b. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes. c. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.
MAFS.6.NS.3.7:	Understand ordering and absolute value of rational numbers. a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. *For example, interpret -3 > -7 as a statement that -3 is located to the right of -7 on a number line oriented from left to right.* b. Write, interpret, and explain statements of order for rational numbers in real-world contexts. *For example, write -3 ºC > -7 ºC to express the fact that -3 ºC is warmer than -7 ºC.* c. Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. *For example, for an account balance of -30 dollars, write |-30| = 30 to describe the size of the debt in dollars.* d. Distinguish comparisons of absolute value from statements about order. *For example, recognize that an account balance less than -30 dollars represents a debt greater than 30 dollars.*
MAFS.6.NS.3.8:	Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate. **Clarifications:** **Examples of Opportunities for In-Depth Focus** When students work with rational numbers in the coordinate plane to solve problems, they combine and consolidate elements from the other standards in this cluster.
MAFS.6.RP.1.1:	Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. *For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."*
MAFS.6.RP.1.2:	Understand the concept of a unit rate a/b associated with a ratio a:b with b ≠ 0, and use rate language in the context of a ratio relationship. *For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger."*
	Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.

MAFS.6.RP.1.3:	a. Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios. b. Solve unit rate problems including those involving unit pricing and constant speed. *For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?* c. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent. d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities. e. Understand the concept of Pi as the ratio of the circumference of a circle to its diameter. ([1]See Table 2 Common Multiplication and Division Situations) **Clarifications:** **Examples of Opportunities for In-Depth Focus** When students work toward meeting this standard, they use a range of reasoning and representations to analyze proportional relationships.
MAFS.6.SP.1.1:	Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. *For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.*
MAFS.6.SP.1.2:	Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.
MAFS.6.SP.1.3:	Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.
MAFS.6.SP.2.4:	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
MAFS.6.SP.2.5:	Summarize numerical data sets in relation to their context, such as by: a. Reporting the number of observations. b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.
MAFS.7.EE.1.1:	Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.
MAFS.7.EE.1.2:	Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. *For example, a + 0.05a = 1.05a means that "increase by 5%" is the same as "multiply by 1.05."*
MAFS.7.NS.1.1:	Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. a. Describe situations in which opposite quantities combine to make 0. *For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.* b. Understand p + q as the number located a distance |q| from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts. c. Understand subtraction of rational numbers as adding the additive inverse, p – q = p + (–q). Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts. d. Apply properties of operations as strategies to add and subtract rational numbers. **Clarifications:** **Fluency Expectations or Examples of Culminating Standards** Adding, subtracting, multiplying, and dividing rational numbers is the culmination of numerical work with the four basic operations. The number system will continue to develop in grade 8, expanding to become the real numbers by the introduction of irrational numbers, and will develop further in high school, expanding to become the complex numbers with the introduction of imaginary numbers. Because there are no specific standards for rational number arithmetic in later grades and because so much other work in grade 7 depends on rational number arithmetic, fluency with rational number arithmetic should be the goal in grade 7.
MAFS.7.NS.1.2:	Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (–1)(–1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts. b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then –(p/q) = (–p)/q = p/(–q). Interpret quotients of rational numbers by describing real-world contexts. c. Apply properties of operations as strategies to multiply and divide rational numbers. d. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats. **Clarifications:** **Fluency Expectations or Examples of Culminating Standards** Adding, subtracting, multiplying, and dividing rational numbers is the culmination of numerical work with the four basic operations. The number system will continue to develop in grade 8, expanding to become the real numbers by the introduction of irrational numbers, and will develop further in high school, expanding to become the complex numbers with the introduction of imaginary numbers. Because there are no specific standards for rational number arithmetic in later grades and because so much other work in grade 7 depends on rational number arithmetic, fluency with rational number arithmetic should be the goal in grade 7.
	Solve real-world and mathematical problems involving the four operations with rational numbers.

MAFS.7.NS.1.3:	**Clarifications:** **Examples of Opportunities for In-Depth Focus** When students work toward meeting this standard (which is closely connected to 7.NS.1.1 and 7.NS.1.2), they consolidate their skill and understanding of addition, subtraction, multiplication and division of rational numbers.
MAFS.7.RP.1.1:	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. *For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2/1/4 miles per hour, equivalently 2 miles per hour.*
MAFS.7.RP.1.2:	Recognize and represent proportional relationships between quantities. a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin. b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. c. Represent proportional relationships by equations. *For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn.* d. Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate. **Clarifications:** **Examples of Opportunities for In-Depth Focus** Students in grade 7 grow in their ability to recognize, represent, and analyze proportional relationships in various ways, including by using tables, graphs, and equations.
MAFS.7.RP.1.3:	Use proportional relationships to solve multistep ratio and percent problems. *Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.*
MAFS.K12.MP.1.1:	**Make sense of problems and persevere in solving them.** Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
MAFS.K12.MP.2.1:	**Reason abstractly and quantitatively**. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
MAFS.K12.MP.3.1:	**Construct viable arguments and critique the reasoning of others.** Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
MAFS.K12.MP.4.1:	**Model with mathematics.** Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
MAFS.K12.MP.5.1:	**Use appropriate tools strategically.** Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other

	mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
MAFS.K12.MP.6.1:	**Attend to precision.** Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
MAFS.K12.MP.7.1:	**Look for and make use of structure.** Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 – 3(x – y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
MAFS.K12.MP.8.1:	**Look for and express regularity in repeated reasoning.** Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y – 2)/(x – 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x – 1)(x + 1)$, $(x – 1)(x^2 + x + 1)$, and $(x – 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
LAFS.6.SL.1.1:	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly. a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion. b. Follow rules for collegial discussions, set specific goals and deadlines, and define individual roles as needed. c. Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under discussion. d. Review the key ideas expressed and demonstrate understanding of multiple perspectives through reflection and paraphrasing.
LAFS.6.SL.1.2:	Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.
LAFS.6.SL.1.3:	Delineate a speaker's argument and specific claims, distinguishing claims that are supported by reasons and evidence from claims that are not.
LAFS.6.SL.2.4:	Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.
LAFS.68.RST.1.3:	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
LAFS.68.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.
LAFS.68.RST.3.7:	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
LAFS.68.WHST.1.1:	Write arguments focused on *discipline-specific content.* a. Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically. b. Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources. c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence. d. Establish and maintain a formal style. e. Provide a concluding statement or section that follows from and supports the argument presented.
LAFS.68.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

GENERAL NOTES

MAFS.6

In this Grade 6 Advanced Mathematics course, instructional time should focus on six critical areas: (1) connecting ratio and rate to whole number multiplication and division and using concepts of ratio and rate to solve problems; (2) completing understanding of division of fractions and extending the notion of number to the system of rational numbers, which includes negative numbers; (3) writing, interpreting, and using expressions and equations; (4) developing understanding of statistical thinking; (5) developing understanding of and applying proportional relationships; and (6) developing understanding of operations with rational numbers and working with expressions and linear equations.

1. Students use reasoning about multiplication and division to solve ratio and rate problems about quantities. By viewing equivalent ratios and rates as deriving from, and extending, pairs of rows (or columns) in the multiplication table, and by analyzing simple drawings that indicate the relative size of quantities, students connect their understanding of multiplication and division with ratios and rates. Thus students expand the scope of problems for which they can use multiplication and division to solve problems, and they connect ratios and fractions. Students solve a wide variety of problems involving ratios and rates.

1. Students use the meaning of fractions, the meanings of multiplication and division, and the relationship between multiplication and division to understand and explain why the procedures for dividing fractions make sense. Students use these operations to solve problems. Students extend their previous understandings of number and the ordering of numbers to the full system of rational numbers, which includes negative rational numbers, and in particular negative integers. They reason about the order and absolute value of rational numbers and about the location of points in all four quadrants of the coordinate plane.

1. Students understand the use of variables in mathematical expressions. They write expressions and equations that correspond to given situations, evaluate expressions, and use expressions and formulas to solve problems. Students understand that expressions in different forms can be equivalent, and they use the properties of operations to rewrite expressions in equivalent forms. Students know that the solutions of an equation are the values of the variables that make the equation true. Students use properties of operations and the idea of maintaining the equality of both sides of an equation to solve simple one-step equations. Students construct and analyze tables, such as tables of quantities that are equivalent ratios, and they use equations (such as $3x = y$) to describe relationships between quantities.

1. Building on and reinforcing their understanding of number, students begin to develop their ability to think statistically. Students recognize that a data distribution may not have a definite center and that different ways to measure center yield different values. The median measures center in the sense that it is roughly the middle value. The mean measures center in the sense that it is the value that each data point would take on if the total of the data values were redistributed equally, and also in the sense that it is a balance point. Students recognize that a measure of variability (interquartile range or mean absolute deviation) can also be useful for summarizing data because two very different set of data can have the same mean and median yet be distinguished by their variability. Students learn to describe and summarize numerical data sets, identifying clusters, peaks, gaps, and symmetry, considering the context in which the data were collected.

1. Students extend their understanding of ratios and develop understanding of proportionality to solve single- and multi-step problems. Students use their understanding of ratios and proportionality to solve a wide variety of percent problems, including those involving discounts, interest, taxes, tips, and percent increase or decrease. Students solve problems about scale drawings by relating corresponding lengths between the objects or by using the fact that relationships of lengths within an object are preserved in similar objects. Students graph proportional relationships and understand the unit rate informally as a measure of the steepness of the related line, called the slope. They distinguish proportional relationships from other relationships.

1. Students develop a unified understanding of number, recognizing fractions, decimals (that have a finite or a repeating decimal representation), and percents as different representations of rational numbers. Students extend addition, subtraction, multiplication, and division to all rational numbers, maintaining the properties of operations and the relationships between addition and subtraction, and multiplication and division. By applying these properties, and by viewing negative numbers in terms of everyday contexts (e.g., amounts owed or temperatures below zero), students explain and interpret the rules for adding, subtracting, multiplying, and dividing with negative numbers. They use the arithmetic of rational numbers as they formulate expressions and equations in one variable and use these equations to solve problems.

Students in Grade 6 also build on their work with area in elementary school by reasoning about relationships among shapes to determine area, surface area, and volume. They find areas of right triangles, other triangles, and special quadrilaterals by decomposing these shapes, rearranging or removing pieces, and relating the shapes to rectangles. Using these methods, students discuss, develop, and justify formulas for areas of triangles and parallelograms. Students find areas of polygons and surface areas of prisms and pyramids by decomposing them into pieces whose area they can determine. They reason about right rectangular prisms with fractional side lengths to extend formulas for the volume of a right rectangular prism to fractional side lengths. They prepare for work on scale drawings and constructions in Grade 7 by drawing polygons in the coordinate plane.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:
https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

Florida Standards Implementation Guide Focus Section:

The Mathematics Florida Standards Implementation Guide was created to support the teaching and learning of the Mathematics Florida Standards. The guide is compartmentalized into three components: focus, coherence, and rigor. Focus means narrowing the scope of content in each grade or course, so students achieve higher levels of understanding and experience math concepts more deeply. The Mathematics standards allow for the teaching and learning of mathematical concepts focused around major clusters at each grade level, enhanced by supporting and additional clusters. The major, supporting and additional clusters are identified, in relation to each grade or course. The cluster designations for this course are below.

Major Clusters

MAFS.6.RP.1 Understand ratio concepts and use ratio reasoning to solve problems.

MAFS.6.NS.1 Apply and extend previous understandings of multiplication and division to divide fractions.

MAFS.6.NS.3 Apply and extend previous understandings of numbers to the system of rational numbers.

MAFS.6.EE.1 Apply and extend previous understanding of arithmetic to algebraic expressions.

MAFS.6.EE.2 Reason about and solve one-step equations and inequalities.

MAFS.6.EE.3 Represent and analyze quantitative relationships between dependent and independent variables.

MAFS.7.RP.1 Analyze proportional relationships and use them to solve real-world and mathematical problems.

MAFS.7.EE.1 Use properties of operations to generate equivalent expressions.

MAFS.7.NS.1 Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

Supporting Clusters

MAFS.6.G.1 Solve real-world and mathematical problems involving area, surface area, and volume.

Additional Clusters

MAFS.6.NS.2 Compute fluently with multi-digit numbers and find common factors and multiples.

MAFS.6.SP.1 Develop understanding of statistical variability.

MAFS.6.SP.2 Summarize and describe distributions.

Note: Clusters should not be sorted from major to supporting and then taught in that order. To do so would strip the coherence of the mathematical ideas and miss the opportunity to enhance the major work of the grade with the supporting and additional clusters.

GENERAL INFORMATION

Course Number: 1205020

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 6 to 8 Education Courses > **Subject:** Mathematics > **SubSubject:** General Mathematics >

Abbreviated Title: M/J ACCEL MATH GR 6

Course Length: Year (Y)

Course Attributes:

- Class Size Core Required

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 6

Educator Certifications

Mathematics (Elementary Grades 1-6)
Middle Grades Mathematics (Middle Grades 5-9)
Mathematics (Grades 6-12)
Middle Grades Integrated Curriculum (Middle Grades 5-9)
Elementary Education (Grades K-6)
Elementary Education (Elementary Grades 1-6)

M/J Accelerated Mathematics Grade 6 (#1205020) 2022 - And Beyond

Course Standards

Name	Description
MA.6.AR.1.1:	Given a mathematical or real-world context, translate written descriptions into algebraic expressions and translate algebraic expressions into written descriptions.
MA.6.AR.1.2:	Translate a real-world written description into an algebraic inequality in the form of $x > a$, $x < a$, $x \geq a$ or $x \leq a$. Represent the inequality on a number line. **Clarifications:** *Clarification 1:* Variables may be on the left or right side of the inequality symbol.
MA.6.AR.1.3:	Evaluate algebraic expressions using substitution and order of operations. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is to perform all operations with integers. *Clarification 2:* Refer to Properties of Operations, Equality and Inequality (Appendix D).
MA.6.AR.1.4:	Apply the properties of operations to generate equivalent algebraic expressions with integer coefficients. **Clarifications:** *Clarification 1:* Properties include associative, commutative and distributive. *Clarification 2:* Refer to Properties of Operations, Equality and Inequality (Appendix D).
MA.6.AR.2.1:	Given an equation or inequality and a specified set of integer values, determine which values make the equation or inequality true or false. **Clarifications:** *Clarification 1:* Problems include the variable in multiple terms or on either side of the equal sign or inequality symbol.
MA.6.AR.2.2:	Write and solve one-step equations in one variable within a mathematical or real-world context using addition and subtraction, where all terms and solutions are integers. **Clarifications:** *Clarification 1:* Instruction includes using manipulatives, drawings, number lines and inverse operations. *Clarification 2:* Instruction includes equations in the forms x+p=q and p+x=q, where x,p and q are any integer. *Clarification 3:* Problems include equations where the variable may be on either side of the equal sign.
MA.6.AR.2.3:	Write and solve one-step equations in one variable within a mathematical or real-world context using multiplication and division, where all terms and solutions are integers. **Clarifications:** *Clarification 1:* Instruction includes using manipulatives, drawings, number lines and inverse operations. *Clarification 2:* Instruction includes equations in the forms $\frac{x}{p} = q$, where p≠0, and px=q. *Clarification 3:* Problems include equations where the variable may be on either side of the equal sign.
MA.6.AR.2.4:	Determine the unknown decimal or fraction in an equation involving any of the four operations, relating three numbers, with the unknown in any position. **Clarifications:** *Clarification 1:* Instruction focuses on using algebraic reasoning, drawings, and mental math to determine unknowns. *Clarification 2:* Problems include the unknown and different operations on either side of the equal sign. All terms and solutions are limited to positive rational numbers.
MA.6.AR.3.1:	Given a real-world context, write and interpret ratios to show the relative sizes of two quantities using appropriate notation: , a to b, or a:b where b ≠ 0. **Clarifications:** *Clarification 1:* Instruction focuses on the understanding that a ratio can be described as a comparison of two quantities in either the same or different units. *Clarification 2:* Instruction includes using manipulatives, drawings, models and words to interpret part-to-part ratios and part-to-whole ratios. *Clarification 3:* The values of a and b are limited to whole numbers.
MA.6.AR.3.2:	Given a real-world context, determine a rate for a ratio of quantities with different units. Calculate and interpret the corresponding unit rate. **Clarifications:** *Clarification 1:* Instruction includes using manipulatives, drawings, models and words and making connections between ratios, rates and unit rates. *Clarification 2:* Problems will not include conversions between customary and metric systems.

MA.6.AR.3.3:	Extend previous understanding of fractions and numerical patterns to generate or complete a two- or three-column table to display equivalent part-to-part ratios and part-to-part-to-whole ratios. **Clarifications:** *Clarification 1:* Instruction includes using two-column tables (e.g., a relationship between two variables) and three-column tables (e.g., part-to-part-to-whole relationship) to generate conversion charts and mixture charts.
MA.6.AR.3.4:	Apply ratio relationships to solve mathematical and real-world problems involving percentages using the relationship between two quantities. **Clarifications:** *Clarification 1:* Instruction includes the comparison of $\frac{part}{whole}$ to $\frac{percent}{100}$ in order to determine the percent, the part or the whole.
MA.6.AR.3.5:	Solve mathematical and real-world problems involving ratios, rates and unit rates, including comparisons, mixtures, ratios of lengths and conversions within the same measurement system. **Clarifications:** *Clarification 1:* Instruction includes the use of tables, tape diagrams and number lines.
MA.6.DP.1.1:	Recognize and formulate a statistical question that would generate numerical data.
MA.6.DP.1.2:	Given a numerical data set within a real-world context, find and interpret mean, median, mode and range. **Clarifications:** *Clarification 1:* Numerical data is limited to positive rational numbers.
MA.6.DP.1.3:	Given a box plot within a real-world context, determine the minimum, the lower quartile, the median, the upper quartile and the maximum. Use this summary of the data to describe the spread and distribution of the data. **Clarifications:** *Clarification 1:* Instruction includes describing range, interquartile range, halves and quarters of the data.
MA.6.DP.1.4:	Given a histogram or line plot within a real-world context, qualitatively describe and interpret the spread and distribution of the data, including any symmetry, skewness, gaps, clusters, outliers and the range. **Clarifications:** *Clarification 1:* Refer to K-12 Mathematics Glossary (Appendix C).
MA.6.DP.1.5:	Create box plots and histograms to represent sets of numerical data within real-world contexts. **Clarifications:** *Clarification 1:* Instruction includes collecting data and discussing ways to collect truthful data to construct graphical representations. *Clarification 2:* Within this benchmark, it is the expectation to use appropriate titles, labels, scales and units when constructing graphical representations. *Clarification 3:* Numerical data is limited to positive rational numbers.
MA.6.DP.1.6:	Given a real-world scenario, determine and describe how changes in data values impact measures of center and variation. **Clarifications:** *Clarification 1:* Instruction includes choosing the measure of center or measure of variation depending on the scenario. *Clarification 2:* The measures of center are limited to mean and median. The measures of variation are limited to range and interquartile range. *Clarification 3:* Numerical data is limited to positive rational numbers.
MA.6.GR.1.1:	Extend previous understanding of the coordinate plane to plot rational number ordered pairs in all four quadrants and on both axes. Identify the x- or y-axis as the line of reflection when two ordered pairs have an opposite x- or y-coordinate.
MA.6.GR.1.2:	Find distances between ordered pairs, limited to the same x-coordinate or the same y-coordinate, represented on the coordinate plane.
MA.6.GR.1.3:	Solve mathematical and real-world problems by plotting points on a coordinate plane, including finding the perimeter or area of a rectangle. **Clarifications:** *Clarification 1:* Instruction includes finding distances between points, computing dimensions of a rectangle or determining a fourth vertex of a rectangle. *Clarification 2:* Problems involving rectangles are limited to cases where the sides are parallel to the axes.
MA.6.GR.2.1:	Derive a formula for the area of a right triangle using a rectangle. Apply a formula to find the area of a triangle. **Clarifications:** *Clarification 1:* Instruction focuses on the relationship between the area of a rectangle and the area of a right triangle. *Clarification 2:* Within this benchmark, the expectation is to know from memory a formula for the area of a triangle.
MA.6.GR.2.2:	Solve mathematical and real-world problems involving the area of quadrilaterals and composite figures by decomposing them into triangles or rectangles. **Clarifications:** *Clarification 1:* Problem types include finding area of composite shapes and determining missing dimensions. *Clarification 2:* Within this benchmark, the expectation is to know from memory a formula for the area of a rectangle and triangle. *Clarification 3:* Dimensions are limited to positive rational numbers.
MA.6.GR.2.3:	Solve mathematical and real-world problems involving the volume of right rectangular prisms with positive rational number edge lengths using a visual model and a formula. **Clarifications:** *Clarification 1:* Problem types include finding the volume or a missing dimension of a rectangular prism.
	Given a mathematical or real-world context, find the surface area of right rectangular prisms and right rectangular pyramids using the figure's net. **Clarifications:** *Clarification 1:* Instruction focuses on representing a right rectangular prism and right rectangular pyramid with its net and on the connection

MA.6.GR.2.4:	between the surface area of a figure and its net. *Clarification 2:* Within this benchmark, the expectation is to find the surface area when given a net or when given a three-dimensional figure. *Clarification 3:* Problems involving right rectangular pyramids are limited to cases where the heights of triangles are given. *Clarification 4:* Dimensions are limited to positive rational numbers.
MA.6.NSO.1.1:	Extend previous understanding of numbers to define rational numbers. Plot, order and compare rational numbers. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is to plot, order and compare positive and negative rational numbers when given in the same form and to plot, order and compare positive rational numbers when given in different forms (fraction, decimal, percentage). *Clarification 2:* Within this benchmark, the expectation is to use symbols (<, > or =).
MA.6.NSO.1.2:	Given a mathematical or real-world context, represent quantities that have opposite direction using rational numbers. Compare them on a number line and explain the meaning of zero within its context. **Clarifications:** *Clarification 1:* Instruction includes vertical and horizontal number lines, context referring to distances, temperatures and finances and using informal verbal comparisons, such as, lower, warmer or more in debt. *Clarification 2:* Within this benchmark, the expectation is to compare positive and negative rational numbers when given in the same form.
MA.6.NSO.1.3:	Given a mathematical or real-world context, interpret the absolute value of a number as the distance from zero on a number line. Find the absolute value of rational numbers. **Clarifications:** *Clarification 1:* Instruction includes the connection of absolute value to mirror images about zero and to opposites. *Clarification 2:* Instruction includes vertical and horizontal number lines and context referring to distances, temperature and finances.
MA.6.NSO.1.4:	Solve mathematical and real-world problems involving absolute value, including the comparison of absolute value. **Clarifications:** *Clarification 1:* Absolute value situations include distances, temperatures and finances. *Clarification 2:* Problems involving calculations with absolute value are limited to two or fewer operations. *Clarification 3:* Within this benchmark, the expectation is to use integers only.
MA.6.NSO.2.1:	Multiply and divide positive multi-digit numbers with decimals to the thousandths, including using a standard algorithm with procedural fluency. **Clarifications:** *Clarification 1:* Multi-digit decimals are limited to no more than 5 total digits.
MA.6.NSO.2.2:	Extend previous understanding of multiplication and division to compute products and quotients of positive fractions by positive fractions, including mixed numbers, with procedural fluency. **Clarifications:** *Clarification 1:* Instruction focuses on making connections between visual models, the relationship between multiplication and division, reciprocals and algorithms.
MA.6.NSO.2.3:	Solve multi-step real-world problems involving any of the four operations with positive multi-digit decimals or positive fractions, including mixed numbers. **Clarifications:** *Clarification 1:* Within this benchmark, it is not the expectation to include both decimals and fractions within a single problem.
MA.6.NSO.3.1:	Given a mathematical or real-world context, find the greatest common factor and least common multiple of two whole numbers. **Clarifications:** *Clarification 1:* Within this benchmark, expectations include finding greatest common factor within 1,000 and least common multiple with factors to 25. *Clarification 2*: Instruction includes finding the greatest common factor of the numerator and denominator of a fraction to simplify a fraction.
MA.6.NSO.3.2:	Rewrite the sum of two composite whole numbers having a common factor, as a common factor multiplied by the sum of two whole numbers. **Clarifications:** *Clarification 1:* Instruction includes using the distributive property to generate equivalent expressions.
MA.6.NSO.3.3:	Evaluate positive rational numbers and integers with natural number exponents. **Clarifications:** *Clarification 1:* Within this benchmark, expectations include using natural number exponents up to 5.
MA.6.NSO.3.4:	Express composite whole numbers as a product of prime factors with natural number exponents.
MA.6.NSO.3.5:	Rewrite positive rational numbers in different but equivalent forms including fractions, terminating decimals and percentages. **Clarifications:** *Clarification 1:* Rational numbers include decimal equivalence up to the thousandths place.
MA.6.NSO.4.1:	Apply and extend previous understandings of operations with whole numbers to add and subtract integers with procedural fluency. **Clarifications:** *Clarification 1:* Instruction begins with the use of manipulatives, models and number lines working towards becoming procedurally fluent by the end of grade 6. *Clarification 2:* Instruction focuses on the inverse relationship between the operations of addition and subtraction. If p and q are integers, then p-q=p+(-q) and p+q=p-(-q).
	Apply and extend previous understandings of operations with whole numbers to multiply and divide integers with procedural fluency. **Clarifications:** *Clarification 1:* Instruction includes the use of models and number lines and the inverse relationship between multiplication and division, working

MA.6.NSO.4.2:	towards becoming procedurally fluent by the end of grade 6. *Clarification 2:* Instruction focuses on the understanding that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers where q≠0, then $-\left(\frac{p}{q}\right)=\frac{-p}{q}$, $-\left(\frac{p}{q}\right)=\frac{p}{-q}$ and $\frac{p}{q}=\frac{-p}{-q}$.
MA.7.AR.1.1:	Apply properties of operations to add and subtract linear expressions with rational coefficients. **Clarifications:** *Clarification 1:* Instruction includes linear expressions in the form ax±b or b±ax, where a and b are rational numbers. *Clarification 2:* Refer to Properties of Operations, Equality and Inequality (Appendix D).
MA.7.AR.1.2:	Determine whether two linear expressions are equivalent. **Clarifications:** *Clarification 1:* Instruction includes using properties of operations accurately and efficiently. *Clarification 2:* Instruction includes linear expressions in any form with rational coefficients. *Clarification 3:* Refer to Properties of Operations, Equality and Inequality (Appendix D).
MA.7.AR.2.1:	Write and solve one-step inequalities in one variable within a mathematical context and represent solutions algebraically or graphically. **Clarifications:** *Clarification 1:* Instruction focuses on the properties of inequality. Refer to Properties of Operations, Equality and Inequality (Appendix D). *Clarification 2:* Instruction includes inequalities in the forms $px > q$; $\frac{x}{p} > q$; x±p>q and p±x>q, where p and q are specific rational numbers and any inequality symbol can be represented. *Clarification 3:* Problems include inequalities where the variable may be on either side of the inequality symbol.
MA.7.AR.3.1:	Apply previous understanding of percentages and ratios to solve multi-step real-world percent problems. **Clarifications:** *Clarification 1:* Instruction includes discounts, markups, simple interest, tax, tips, fees, percent increase, percent decrease and percent error.
MA.7.AR.3.2:	Apply previous understanding of ratios to solve real-world problems involving proportions.
MA.7.DP.1.1:	Determine an appropriate measure of center or measure of variation to summarize numerical data, represented numerically or graphically, taking into consideration the context and any outliers. **Clarifications:** *Clarification 1:* Instruction includes recognizing whether a measure of center or measure of variation is appropriate and can be justified based on the given context or the statistical purpose. *Clarification 2:* Graphical representations are limited to histograms, line plots, box plots and stem-and-leaf plots. *Clarification 3:* The measure of center is limited to mean and median. The measure of variation is limited to range and interquartile range.
MA.7.DP.1.2:	Given two numerical or graphical representations of data, use the measure(s) of center and measure(s) of variability to make comparisons, interpret results and draw conclusions about the two populations. **Clarifications:** *Clarification 1:* Graphical representations are limited to histograms, line plots, box plots and stem-and-leaf plots. *Clarification 2:* The measure of center is limited to mean and median. The measure of variation is limited to range and interquartile range.
MA.7.DP.1.3:	Given categorical data from a random sample, use proportional relationships to make predictions about a population.
MA.7.DP.2.1:	Determine the sample space for a simple experiment. **Clarifications:** *Clarification 1:* Simple experiments include tossing a fair coin, rolling a fair die, picking a card randomly from a deck, picking marbles randomly from a bag and spinning a fair spinner.
MA.7.DP.2.2:	Given the probability of a chance event, interpret the likelihood of it occurring. Compare the probabilities of chance events. **Clarifications:** *Clarification 1:* Instruction includes representing probability as a fraction, percentage or decimal between 0 and 1 with probabilities close to 1 corresponding to highly likely events and probabilities close to 0 corresponding to highly unlikely events. *Clarification 2:* Instruction includes P(event) notation. *Clarification 3:* Instruction includes representing probability as a fraction, percentage or decimal.
MA.7.DP.2.3:	Find the theoretical probability of an event related to a simple experiment. **Clarifications:** *Clarification 1:* Instruction includes representing probability as a fraction, percentage or decimal. *Clarification 2:* Simple experiments include tossing a fair coin, rolling a fair die, picking a card randomly from a deck, picking marbles randomly from a bag and spinning a fair spinner.
MA.7.DP.2.4:	Use a simulation of a simple experiment to find experimental probabilities and compare them to theoretical probabilities. **Clarifications:** *Clarification 1:* Instruction includes representing probability as a fraction, percentage or decimal. *Clarification 2:* Instruction includes recognizing that experimental probabilities may differ from theoretical probabilities due to random variation. As the number of repetitions increases experimental probabilities will typically better approximate the theoretical probabilities. *Clarification 3:* Experiments include tossing a fair coin, rolling a fair die, picking a card randomly from a deck, picking marbles randomly from a bag and spinning a fair spinner.
	Apply formulas to find the areas of trapezoids, parallelograms and rhombi. **Clarifications:**

MA.7.GR.1.1:	*Clarification 1:* Instruction focuses on the connection from the areas of trapezoids, parallelograms and rhombi to the areas of rectangles or triangles. *Clarification 2:* Within this benchmark, the expectation is not to memorize area formulas for trapezoids, parallelograms and rhombi.
MA.7.GR.1.2:	Solve mathematical or real-world problems involving the area of polygons or composite figures by decomposing them into triangles or quadrilaterals. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is not to find areas of figures on the coordinate plane or to find missing dimensions.
MA.7.NSO.2.1:	Solve mathematical problems using multi-step order of operations with rational numbers including grouping symbols, whole-number exponents and absolute value. **Clarifications:** *Clarification 1:* Multi-step expressions are limited to 6 or fewer steps.
MA.7.NSO.2.2:	Add, subtract, multiply and divide rational numbers with procedural fluency.
MA.7.NSO.2.3:	Solve real-world problems involving any of the four operations with rational numbers. **Clarifications:** *Clarification 1:* Instruction includes using one or more operations to solve problems.
MA.K12.MTR.1.1:	Mathematicians who participate in effortful learning both individually and with others: • Analyze the problem in a way that makes sense given the task. • Ask questions that will help with solving the task. • Build perseverance by modifying methods as needed while solving a challenging task. • Stay engaged and maintain a positive mindset when working to solve tasks. • Help and support each other when attempting a new method or approach. **Clarifications:** Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: • Build understanding through modeling and using manipulatives. • Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. • Progress from modeling problems with objects and drawings to using algorithms and equations. • Express connections between concepts and representations. • Choose a representation based on the given context or purpose. **Clarifications:** Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations. **Clarifications:** Teachers who encourage students to complete tasks with mathematical fluency: • Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. • Offer multiple opportunities for students to practice efficient and generalizable methods. • Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: • Communicate mathematical ideas, vocabulary and methods effectively. • Analyze the mathematical thinking of others. • Compare the efficiency of a method to those expressed by others. • Recognize errors and suggest how to correctly solve the task. • Justify results by explaining methods and processes. • Construct possible arguments based on evidence. **Clarifications:** Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers.

MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. **Clarifications:** Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. **Clarifications:** Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems. • Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. **Clarifications:** Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. **Clarifications:** K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. **Clarifications:** See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. **Clarifications:** Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. **Clarifications:** In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think _______ because ______." The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.

ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. **Clarifications:** Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. **Clarifications:** In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

General Course Information and Notes

VERSION DESCRIPTION

In grade 6 accelerated, instructional time will emphasize five areas: (1) performing all four operations with rational numbers with procedural fluency; (2) exploring and applying concepts of ratios, rates, percentages and proportions to solve problems; (3) creating, interpreting and using expressions, equations and inequalities; (4) extending geometric reasoning to plotting points on the coordinate plane, area and volume of geometric figures and (5) extending understanding of statistical thinking to represent and compare categorical and numerical data.

Curricular content for all subjects must integrate critical-thinking, problem-solving, and workforce-literacy skills; communication, reading, and writing skills; mathematics skills; collaboration skills; contextual and applied-learning skills; technology-literacy skills; information and media-literacy skills; and civic-engagement skills.

GENERAL NOTES

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards
This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:
https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Number: 1205020

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 6 to 8 Education Courses > **Subject:** Mathematics > **SubSubject:** General Mathematics >
Abbreviated Title: M/J ACCEL MATH GR 6
Course Length: Year (Y)
Course Attributes:
- Honors
- Class Size Core Required

Course Type: Core Academic Course
Course Status: State Board Approved
Grade Level(s): 6

Course Level: 3

Educator Certifications

Mathematics (Grades 6-12)
Middle Grades Mathematics (Middle Grades 5-9)

M/J Mathematics 1 Cambridge Lower Secondary (#1205030) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

For more information about this Cambridge course, visit http://www.cie.org.uk/programmes-and-qualifications/cambridge-secondary-1/cambridge-secondary-1/curriculum/.

GENERAL INFORMATION

Course Number: 1205030

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 6 to 8 Education Courses > **Subject:** Mathematics > **SubSubject:** General Mathematics >

Abbreviated Title: M/J MATH 1 CLS

Course Length: Year (Y)

Course Attributes:

- Advanced International Certificate of Education (AICE)

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 6,7,8

Educator Certifications

Mathematics (Elementary Grades 1-6)
Middle Grades Mathematics (Middle Grades 5-9)
Mathematics (Grades 6-12)
Middle Grades Integrated Curriculum (Middle Grades 5-9)
Elementary Education (Grades K-6)
Elementary Education (Elementary Grades 1-6)

M/J Grade 7 Mathematics (#1205040) 2015 - 2022 (current)

Course Standards

Name	Description
MAFS.7.EE.1.1:	Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.
MAFS.7.EE.1.2:	Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. *For example, a + 0.05a = 1.05a means that "increase by 5%" is the same as "multiply by 1.05."*
MAFS.7.EE.2.3:	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. *For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.* **Clarifications:** **Fluency Expectations or Examples of Culminating Standards** Students solve multistep problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. This work is the culmination of many progressions of learning in arithmetic, problem solving and mathematical practices. **Examples of Opportunities for In-Depth Focus** This is a major capstone standard for arithmetic and its applications.
MAFS.7.EE.2.4:	Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. a. Solve word problems leading to equations of the form px + q = r and p(x + q) = r, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. *For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?* b. Solve word problems leading to inequalities of the form px + q > r or px + q < r, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. *For example: As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions.* **Clarifications:** **Fluency Expectations or Examples of Culminating Standards** In solving word problems leading to one-variable equations of the form px + q = r and p(x + q) = r, students solve the equations fluently. This will require fluency with rational number arithmetic (7.NS.1.1–1.3), as well as fluency to some extent with applying properties operations to rewrite linear expressions with rational coefficients (7.EE.1.1). **Examples of Opportunities for In-Depth Focus** Work toward meeting this standard builds on the work that led to meeting 6.EE.2.7 and prepares students for the work that will lead to meeting 8.EE.3.7.
MAFS.7.G.1.1:	Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.
MAFS.7.G.1.2:	Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.
MAFS.7.G.1.3:	Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.
MAFS.7.G.2.4:	Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.
MAFS.7.G.2.5:	Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.
MAFS.7.G.2.6:	Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. **Clarifications:** **Examples of Opportunities for In-Depth Focus** Work toward meeting this standard draws together grades 3–6 work with geometric measurement.
	Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. a. Describe situations in which opposite quantities combine to make 0. *For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.* b. Understand p + q as the number located a distance |q| from p, in the positive or negative direction depending on whether q is positive or

MAFS.7.NS.1.1:	negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts. c. Understand subtraction of rational numbers as adding the additive inverse, p – q = p + (–q). Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts. d. Apply properties of operations as strategies to add and subtract rational numbers. **Clarifications:** **Fluency Expectations or Examples of Culminating Standards** Adding, subtracting, multiplying, and dividing rational numbers is the culmination of numerical work with the four basic operations. The number system will continue to develop in grade 8, expanding to become the real numbers by the introduction of irrational numbers, and will develop further in high school, expanding to become the complex numbers with the introduction of imaginary numbers. Because there are no specific standards for rational number arithmetic in later grades and because so much other work in grade 7 depends on rational number arithmetic, fluency with rational number arithmetic should be the goal in grade 7.
MAFS.7.NS.1.2:	Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (–1)(–1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts. b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then –(p/q) = (–p)/q = p/(–q). Interpret quotients of rational numbers by describing real-world contexts. c. Apply properties of operations as strategies to multiply and divide rational numbers. d. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats. **Clarifications:** **Fluency Expectations or Examples of Culminating Standards** Adding, subtracting, multiplying, and dividing rational numbers is the culmination of numerical work with the four basic operations. The number system will continue to develop in grade 8, expanding to become the real numbers by the introduction of irrational numbers, and will develop further in high school, expanding to become the complex numbers with the introduction of imaginary numbers. Because there are no specific standards for rational number arithmetic in later grades and because so much other work in grade 7 depends on rational number arithmetic, fluency with rational number arithmetic should be the goal in grade 7.
MAFS.7.NS.1.3:	Solve real-world and mathematical problems involving the four operations with rational numbers. **Clarifications:** **Examples of Opportunities for In-Depth Focus** When students work toward meeting this standard (which is closely connected to 7.NS.1.1 and 7.NS.1.2), they consolidate their skill and understanding of addition, subtraction, multiplication and division of rational numbers.
MAFS.7.RP.1.1:	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. *For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2/1/4 miles per hour, equivalently 2 miles per hour.*
MAFS.7.RP.1.2:	Recognize and represent proportional relationships between quantities. a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin. b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. c. Represent proportional relationships by equations. *For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn.* d. Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate. **Clarifications:** **Examples of Opportunities for In-Depth Focus** Students in grade 7 grow in their ability to recognize, represent, and analyze proportional relationships in various ways, including by using tables, graphs, and equations.
MAFS.7.RP.1.3:	Use proportional relationships to solve multistep ratio and percent problems. *Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.*
MAFS.7.SP.1.1:	Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.
MAFS.7.SP.1.2:	Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. *For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.*
MAFS.7.SP.2.3:	Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. *For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.*
	Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two

MAFS.7.SP.2.4:	populations. *For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.*
MAFS.7.SP.3.5:	Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.
MAFS.7.SP.3.6:	Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. *For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.*
MAFS.7.SP.3.7:	Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. a. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. *For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected.* b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. *For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?*
MAFS.7.SP.3.8:	Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. a. Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. b. Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., “rolling double sixes”), identify the outcomes in the sample space which compose the event. c. Design and use a simulation to generate frequencies for compound events. *For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?*
MAFS.K12.MP.1.1:	**Make sense of problems and persevere in solving them.** Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
MAFS.K12.MP.2.1:	**Reason abstractly and quantitatively**. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
MAFS.K12.MP.3.1:	**Construct viable arguments and critique the reasoning of others.** Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
MAFS.K12.MP.4.1:	**Model with mathematics.** Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
MAFS.K12.MP.5.1:	**Use appropriate tools strategically.** Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to

	identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
MAFS.K12.MP.6.1:	**Attend to precision.** Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
MAFS.K12.MP.7.1:	**Look for and make use of structure.** Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
MAFS.K12.MP.8.1:	**Look for and express regularity in repeated reasoning.** Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
LAFS.68.RST.1.3:	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
LAFS.68.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.
LAFS.68.RST.3.7:	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
LAFS.68.WHST.1.1:	Write arguments focused on *discipline-specific content.* a. Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically. b. Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources. c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence. d. Establish and maintain a formal style. e. Provide a concluding statement or section that follows from and supports the argument presented.
LAFS.68.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.7.SL.1.1:	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others' ideas and expressing their own clearly. a. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion. b. Follow rules for collegial discussions, track progress toward specific goals and deadlines, and define individual roles as needed. c. Pose questions that elicit elaboration and respond to others' questions and comments with relevant observations and ideas that bring the discussion back on topic as needed. d. Acknowledge new information expressed by others and, when warranted, modify their own views.
LAFS.7.SL.1.2:	Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study.
LAFS.7.SL.1.3:	Delineate a speaker's argument and specific claims, evaluating the soundness of the reasoning and the relevance and sufficiency of the evidence.
LAFS.7.SL.2.4:	Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use appropriate eye contact, adequate volume, and clear pronunciation.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

GENERAL NOTES

MAFS.7

In Grade 7,instructional time should focus on four critical area: (1) developing understanding of and applying proportional relationships; (2) developing understanding of operations with rational numbers and working with expressions and linear equations; (3) solving problems involving scale drawings and informal geometric constructions, and working with two- and three-dimensional shapes to solve problems involving area, surface area, and volume; and (4) drawing inferences about populations based on samples.

1. Students extend their understanding of ratios and develop understanding of proportionality to solve single- and multi-step problems. Students use their

understanding of ratios and proportionality to solve a wide variety of percent problems, including those involving discounts, interest, taxes, tips, and percent increase or decrease. Students solve problems about scale drawings by relating corresponding lengths between the objects or by using the fact that relationships of lengths within an object are preserved in similar objects. Students graph proportional relationships and understand the unit rate informally as a measure of the steepness of the related line, called the slope. They distinguish proportional relationships from other relationships.

2. Students develop a unified understanding of number, recognizing fractions, decimals (that have a finite or a repeating decimal representation), and percents as different representations of rational numbers. Students extend addition, subtraction, multiplication, and division to all rational numbers, maintaining the properties of operations and the relationships between addition and subtraction, and multiplication and division. By applying these properties, and by viewing negative numbers in terms of everyday contexts (e.g., amounts owed or temperatures below zero), students explain and interpret the rules for adding, subtracting, multiplying, and dividing with negative numbers. They use the arithmetic of rational numbers as they formulate expressions and equations in one variable and use these equations to solve problems.
3. Students continue their work with area from Grade 6, solving problems involving area and circumference of a circle and surface area of three-dimensional objects. In preparation for work on congruence and similarity in Grade 8 they reason about relationships among two-dimensional figures using scale drawings and informal geometric constructions, and they gain familiarity with the relationship between angles formed by intersecting lines. Students work with three-dimensional figures, relating them to two-dimensional figures by examining cross-sections. They solve real-world and mathematical problems involving area, surface area, and volume of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes and right prisms.
4. Students build on their previous work with single data distributions to compare two data distributions and address questions about difference between populations. They begin informal work with random sampling to generate data sets and learn about the importance of representative samples for drawing inferences.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:
https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

Additional Instructional Resources:
A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGI/cms/review.html?Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

Florida Standards Implementation Guide Focus Section:

The Mathematics Florida Standards Implementation Guide was created to support the teaching and learning of the Mathematics Florida Standards. The guide is compartmentalized into three components: focus, coherence, and rigor.Focus means narrowing the scope of content in each grade or course, so students achieve higher levels of understanding and experience math concepts more deeply. The Mathematics standards allow for the teaching and learning of mathematical concepts focused around major clusters at each grade level, enhanced by supporting and additional clusters. The major, supporting and additional clusters are identified, in relation to each grade or course. The cluster designations for this course are below.

Major Clusters

MAFS.7.RP.1 Analyze proportional relationships and use them to solve real-world and mathematical problems.

MAFS.7.NS.1 Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

MAFS.7.EE.1 Use properties of operations to generate equivalent expressions.

MAFS.7.EE.2 Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

Supporting Clusters

MAFS.7.SP.1 Use random sampling to draw inferences about a population.

MAFS.7.SP.3 Investigate chance processes and develop, use, and evaluate probability models.

Additional Clusters

MAFS.7.G.1 Draw, construct, and describe geometrical figures and describe the relationships between them.

MAFS.7.G.2 Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.

MAFS.7.SP.2 Draw informal comparative inferences about two populations.

Note: Clusters should not be sorted from major to supporting and then taught in that order. To do so would strip the coherence of the mathematical ideas and miss the opportunity to enhance the major work of the grade with the supporting and additional clusters.

GENERAL INFORMATION

Course Number: 1205040

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 6 to 8 Education Courses > **Subject:** Mathematics > **SubSubject:** General Mathematics >

Abbreviated Title: M/J GRADE 7 MATH

Course Length: Year (Y)

Course Attributes:

- Class Size Core Required

Course Type: Core Academic Course

Course Level: 2

Course Status: Course Approved

Grade Level(s): 6,7,8

Educator Certifications

Middle Grades Mathematics (Middle Grades 5-9)
Middle Grades Integrated Curriculum (Middle Grades 5-9)
Mathematics (Grades 6-12)

M/J Grade 7 Mathematics (#1205040) 2022 - And Beyond

Course Standards

Name	Description
MA.7.AR.1.1:	Apply properties of operations to add and subtract linear expressions with rational coefficients. **Clarifications:** *Clarification 1:* Instruction includes linear expressions in the form ax±b or b±ax, where a and b are rational numbers. *Clarification 2:* Refer to Properties of Operations, Equality and Inequality (Appendix D).
MA.7.AR.1.2:	Determine whether two linear expressions are equivalent. **Clarifications:** *Clarification 1:* Instruction includes using properties of operations accurately and efficiently. *Clarification 2:* Instruction includes linear expressions in any form with rational coefficients. *Clarification 3:* Refer to Properties of Operations, Equality and Inequality (Appendix D).
MA.7.AR.2.1:	Write and solve one-step inequalities in one variable within a mathematical context and represent solutions algebraically or graphically. **Clarifications:** *Clarification 1:* Instruction focuses on the properties of inequality. Refer to Properties of Operations, Equality and Inequality (Appendix D). *Clarification 2:* Instruction includes inequalities in the forms $px > q$; $\frac{x}{p} > q$; x±p>q and p±x>q, where p and q are specific rational numbers and any inequality symbol can be represented. *Clarification 3:* Problems include inequalities where the variable may be on either side of the inequality symbol.
MA.7.AR.2.2:	Write and solve two-step equations in one variable within a mathematical or real-world context, where all terms are rational numbers. **Clarifications:** *Clarification 1:* Instruction focuses the application of the properties of equality. Refer to Properties of Operations, Equality and Inequality (Appendix D). *Clarification 2:* Instruction includes equations in the forms px±q=r and p(x±q)=r, where p, q and r are specific rational numbers. *Clarification 3:* Problems include linear equations where the variable may be on either side of the equal sign.
MA.7.AR.3.1:	Apply previous understanding of percentages and ratios to solve multi-step real-world percent problems. **Clarifications:** *Clarification 1:* Instruction includes discounts, markups, simple interest, tax, tips, fees, percent increase, percent decrease and percent error.
MA.7.AR.3.2:	Apply previous understanding of ratios to solve real-world problems involving proportions.
MA.7.AR.3.3:	Solve mathematical and real-world problems involving the conversion of units across different measurement systems.
MA.7.AR.4.1:	Determine whether two quantities have a proportional relationship by examining a table, graph or written description. **Clarifications:** *Clarification 1:* Instruction focuses on the connection to ratios and on the constant of proportionality, which is the ratio between two quantities in a proportional relationship.
MA.7.AR.4.2:	Determine the constant of proportionality within a mathematical or real-world context given a table, graph or written description of a proportional relationship.
MA.7.AR.4.3:	Given a mathematical or real-world context, graph proportional relationships from a table, equation or a written description. **Clarifications:** *Clarification 1:* Instruction includes equations of proportional relationships in the form of y=px, where p is the constant of proportionality.
MA.7.AR.4.4:	Given any representation of a proportional relationship, translate the representation to a written description, table or equation. **Clarifications:** *Clarification 1:* Given representations are limited to a written description, graph, table or equation. *Clarification 2:* Instruction includes equations of proportional relationships in the form of y=px, where p is the constant of proportionality.
MA.7.AR.4.5:	Solve real-world problems involving proportional relationships.
MA.7.DP.1.1:	Determine an appropriate measure of center or measure of variation to summarize numerical data, represented numerically or graphically, taking into consideration the context and any outliers. **Clarifications:** *Clarification 1:* Instruction includes recognizing whether a measure of center or measure of variation is appropriate and can be justified based on the given context or the statistical purpose. *Clarification 2:* Graphical representations are limited to histograms, line plots, box plots and stem-and-leaf plots. *Clarification 3:* The measure of center is limited to mean and median. The measure of variation is limited to range and interquartile range.
MA.7.DP.1.2:	Given two numerical or graphical representations of data, use the measure(s) of center and measure(s) of variability to make comparisons, interpret results and draw conclusions about the two populations. **Clarifications:** *Clarification 1:* Graphical representations are limited to histograms, line plots, box plots and stem-and-leaf plots.

	Clarification 2: The measure of center is limited to mean and median. The measure of variation is limited to range and interquartile range.
MA.7.DP.1.3:	Given categorical data from a random sample, use proportional relationships to make predictions about a population.
MA.7.DP.1.4:	Use proportional reasoning to construct, display and interpret data in circle graphs. **Clarifications:** *Clarification 1:* Data is limited to no more than 6 categories.
MA.7.DP.1.5:	Given a real-world numerical or categorical data set, choose and create an appropriate graphical representation. **Clarifications:** *Clarification 1:* Graphical representations are limited to histograms, bar charts, circle graphs, line plots, box plots and stem-and-leaf plots.
MA.7.DP.2.1:	Determine the sample space for a simple experiment. **Clarifications:** *Clarification 1:* Simple experiments include tossing a fair coin, rolling a fair die, picking a card randomly from a deck, picking marbles randomly from a bag and spinning a fair spinner.
MA.7.DP.2.2:	Given the probability of a chance event, interpret the likelihood of it occurring. Compare the probabilities of chance events. **Clarifications:** *Clarification 1:* Instruction includes representing probability as a fraction, percentage or decimal between 0 and 1 with probabilities close to 1 corresponding to highly likely events and probabilities close to 0 corresponding to highly unlikely events. *Clarification 2:* Instruction includes P(event) notation. *Clarification 3:* Instruction includes representing probability as a fraction, percentage or decimal.
MA.7.DP.2.3:	Find the theoretical probability of an event related to a simple experiment. **Clarifications:** *Clarification 1:* Instruction includes representing probability as a fraction, percentage or decimal. *Clarification 2:* Simple experiments include tossing a fair coin, rolling a fair die, picking a card randomly from a deck, picking marbles randomly from a bag and spinning a fair spinner.
MA.7.DP.2.4:	Use a simulation of a simple experiment to find experimental probabilities and compare them to theoretical probabilities. **Clarifications:** *Clarification 1:* Instruction includes representing probability as a fraction, percentage or decimal. *Clarification 2:* Instruction includes recognizing that experimental probabilities may differ from theoretical probabilities due to random variation. As the number of repetitions increases experimental probabilities will typically better approximate the theoretical probabilities. *Clarification 3:* Experiments include tossing a fair coin, rolling a fair die, picking a card randomly from a deck, picking marbles randomly from a bag and spinning a fair spinner.
MA.7.GR.1.1:	Apply formulas to find the areas of trapezoids, parallelograms and rhombi. **Clarifications:** *Clarification 1:* Instruction focuses on the connection from the areas of trapezoids, parallelograms and rhombi to the areas of rectangles or triangles. *Clarification 2:* Within this benchmark, the expectation is not to memorize area formulas for trapezoids, parallelograms and rhombi.
MA.7.GR.1.2:	Solve mathematical or real-world problems involving the area of polygons or composite figures by decomposing them into triangles or quadrilaterals. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is not to find areas of figures on the coordinate plane or to find missing dimensions.
MA.7.GR.1.3:	Explore the proportional relationship between circumferences and diameters of circles. Apply a formula for the circumference of a circle to solve mathematical and real-world problems. **Clarifications:** *Clarification 1:* Instruction includes the exploration and analysis of circular objects to examine the proportional relationship between circumference and diameter and arrive at an approximation of pi (π) as the constant of proportionality. *Clarification 2:* Solutions may be represented in terms of pi (π) or approximately.
MA.7.GR.1.4:	Explore and apply a formula to find the area of a circle to solve mathematical and real-world problems. **Clarifications:** *Clarification 1:* Instruction focuses on the connection between formulas for the area of a rectangle and the area of a circle. *Clarification 2:* Problem types include finding areas of fractional parts of a circle. *Clarification 3:* Solutions may be represented in terms of pi (π) or approximately.
MA.7.GR.1.5:	Solve mathematical and real-world problems involving dimensions and areas of geometric figures, including scale drawings and scale factors. **Clarifications:** *Clarification 1:* Instruction focuses on seeing the scale factor as a constant of proportionality between corresponding lengths in the scale drawing and the original object. *Clarification 2:* Instruction includes the understanding that if the scaling factor is k, then the constant of proportionality between corresponding areas is k^2 . *Clarification 3:* Problem types include finding the scale factor given a set of dimensions as well as finding dimensions when given a scale factor.
MA.7.GR.2.1:	Given a mathematical or real-world context, find the surface area of a right circular cylinder using the figure's net. **Clarifications:** *Clarification 1:* Instruction focuses on representing a right circular cylinder with its net and on the connection between surface area of a figure and its net. *Clarification 2:* Within this benchmark, the expectation is to find the surface area when given a net or when given a three-dimensional figure.

	Clarification 3: Within this benchmark, the expectation is not to memorize the surface area formula for a right circular cylinder. Clarification 4: Solutions may be represented in terms of pi (π) or approximately.
MA.7.GR.2.2:	Solve real-world problems involving surface area of right circular cylinders. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is not to memorize the surface area formula for a right circular cylinder or to find radius as a missing dimension. *Clarification 2:* Solutions may be represented in terms of pi (π) or approximately.
MA.7.GR.2.3:	Solve mathematical and real-world problems involving volume of right circular cylinders. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is not to memorize the volume formula for a right circular cylinder or to find radius as a missing dimension. *Clarification 2:* Solutions may be represented in terms of pi (π) or approximately.
MA.7.NSO.1.1:	Know and apply the Laws of Exponents to evaluate numerical expressions and generate equivalent numerical expressions, limited to whole-number exponents and rational number bases. **Clarifications:** *Clarification 1:* Instruction focuses on building the Laws of Exponents from specific examples. Refer to the K-12 Formulas (Appendix E) for the Laws of Exponents. *Clarification 2:* Problems in the form $\frac{a^n}{a^m} = a^p$ must result in a whole-number value for p.
MA.7.NSO.1.2:	Rewrite rational numbers in different but equivalent forms including fractions, mixed numbers, repeating decimals and percentages to solve mathematical and real-world problems.
MA.7.NSO.2.1:	Solve mathematical problems using multi-step order of operations with rational numbers including grouping symbols, whole-number exponents and absolute value. **Clarifications:** *Clarification 1:* Multi-step expressions are limited to 6 or fewer steps.
MA.7.NSO.2.2:	Add, subtract, multiply and divide rational numbers with procedural fluency.
MA.7.NSO.2.3:	Solve real-world problems involving any of the four operations with rational numbers. **Clarifications:** *Clarification 1:* Instruction includes using one or more operations to solve problems.
MA.K12.MTR.1.1:	Mathematicians who participate in effortful learning both individually and with others: • Analyze the problem in a way that makes sense given the task. • Ask questions that will help with solving the task. • Build perseverance by modifying methods as needed while solving a challenging task. • Stay engaged and maintain a positive mindset when working to solve tasks. • Help and support each other when attempting a new method or approach. **Clarifications:** Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: • Build understanding through modeling and using manipulatives. • Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. • Progress from modeling problems with objects and drawings to using algorithms and equations. • Express connections between concepts and representations. • Choose a representation based on the given context or purpose. **Clarifications:** Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations. **Clarifications:** Teachers who encourage students to complete tasks with mathematical fluency: • Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.

	• Offer multiple opportunities for students to practice efficient and generalizable methods. • Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: • Communicate mathematical ideas, vocabulary and methods effectively. • Analyze the mathematical thinking of others. • Compare the efficiency of a method to those expressed by others. • Recognize errors and suggest how to correctly solve the task. • Justify results by explaining methods and processes. • Construct possible arguments based on evidence. **Clarifications:** Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. **Clarifications:** Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. **Clarifications:** Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems. • Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. **Clarifications:** Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. **Clarifications:** K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation.

	9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. **Clarifications:** See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. **Clarifications:** Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. **Clarifications:** In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think _______ because ______." The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. **Clarifications:** Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. **Clarifications:** In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

VERSION DESCRIPTION

The benchmarks in this course are mastery goals that students are expected to attain by the end of the year. To build mastery, students will continue to review and apply earlier grade-level benchmarks and expectations.

GENERAL NOTES

In grade 7, instructional time will emphasize five areas: (1) recognizing that fractions, decimals and percentages are different representations of rational numbers and performing all four operations with rational numbers with procedural fluency; (2) creating equivalent expressions and solving equations and inequalities; (3) developing understanding of and applying proportional relationships in two variables; (4) extending analysis of two- and three-dimensional figures to include circles and cylinders and (5) representing and comparing categorical and numerical data and developing understanding of probability.

Curricular content for all subjects must integrate critical-thinking, problem-solving, and workforce-literacy skills; communication, reading, and writing skills; mathematics skills; collaboration skills; contextual and applied-learning skills; technology-literacy skills; information and media-literacy skills; and civic-engagement skills.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:
https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Number: 1205040

Course Path: **Section:** Grades PreK to 12 Education Courses > **Grade Group:** Grades 6 to 8 Education Courses > **Subject:** Mathematics > **SubSubject:** General Mathematics >

Abbreviated Title: M/J GRADE 7 MATH

Course Length: Year (Y)

Course Type: Core Academic Course

Course Level: 2

Course Status: State Board Approved

Educator Certifications

Middle Grades Mathematics (Middle Grades 5-9)
Middle Grades Integrated Curriculum (Middle Grades 5-9)
Mathematics (Grades 6-12)

M/J Accelerated Mathematics Grade 7 (#1205050) 2020 - 2022 (current)

Course Standards

<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td>MAFS.7.EE.2.3:</td><td>Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.

Clarifications:
Fluency Expectations or Examples of Culminating Standards

Students solve multistep problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. This work is the culmination of many progressions of learning in arithmetic, problem solving and mathematical practices.

Examples of Opportunities for In-Depth Focus

This is a major capstone standard for arithmetic and its applications.</td></tr>
<tr><td>MAFS.7.EE.2.4:</td><td>Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.
a. Solve word problems leading to equations of the form px + q = r and p(x + q) = r, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?
b. Solve word problems leading to inequalities of the form px + q > r or px + q < r, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. For example: As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions.

Clarifications:
Fluency Expectations or Examples of Culminating Standards

In solving word problems leading to one-variable equations of the form px + q = r and p(x + q) = r, students solve the equations fluently. This will require fluency with rational number arithmetic (7.NS.1.1–1.3), as well as fluency to some extent with applying properties operations to rewrite linear expressions with rational coefficients (7.EE.1.1).

Examples of Opportunities for In-Depth Focus

Work toward meeting this standard builds on the work that led to meeting 6.EE.2.7 and prepares students for the work that will lead to meeting 8.EE.3.7.</td></tr>
<tr><td>MAFS.7.G.1.1:</td><td>Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.</td></tr>
<tr><td>MAFS.7.G.1.2:</td><td>Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.</td></tr>
<tr><td>MAFS.7.G.1.3:</td><td>Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.</td></tr>
<tr><td>MAFS.7.G.2.4:</td><td>Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.</td></tr>
<tr><td>MAFS.7.G.2.5:</td><td>Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.</td></tr>
<tr><td>MAFS.7.G.2.6:</td><td>Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.

Clarifications:
Examples of Opportunities for In-Depth Focus

Work toward meeting this standard draws together grades 3–6 work with geometric measurement.</td></tr>
<tr><td>MAFS.7.SP.1.1:</td><td>Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.</td></tr>
<tr><td></td><td>Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or</td></tr>
</table>

MAFS.7.SP.1.2:	simulated samples) of the same size to gauge the variation in estimates or predictions. *For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.*
MAFS.7.SP.2.3:	Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. *For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.*
MAFS.7.SP.2.4:	Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. *For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.*
MAFS.7.SP.3.5:	Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.
MAFS.7.SP.3.6:	Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. *For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.*
MAFS.7.SP.3.7:	Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. a. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. *For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected.* b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. *For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?*
MAFS.7.SP.3.8:	Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. a. Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. b. Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., “rolling double sixes”), identify the outcomes in the sample space which compose the event. c. Design and use a simulation to generate frequencies for compound events. *For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?*
MAFS.8.EE.1.1:	Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example,* $3^2 \times$ □ = □ = $1/3^3 = 1/27$.
MAFS.8.EE.1.2:	Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.
MAFS.8.EE.1.3:	Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. *For example, estimate the population of the United States as 3 ×* □ *and the population of the world as 7 ×* □, *and determine that the world population is more than 20 times larger.*
MAFS.8.EE.1.4:	Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.
MAFS.8.EE.2.5:	Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. *For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.* **Clarifications:** **Examples of Opportunities for In-Depth Focus** When students work toward meeting this standard, they build on grades 6–7 work with proportions and position themselves for grade 8 work with functions and the equation of a line.
MAFS.8.EE.2.6:	Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b.
MAFS.8.EE.3.7:	Solve linear equations in one variable. a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form x = a, a = a, or a = b results (where a and b are different numbers). b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms. **Clarifications:** **Fluency Expectations or Examples of Culminating Standards** Students have been working informally with one-variable linear equations since as early as kindergarten. This important line of development culminates in grade 8 with the solution of general one-variable linear equations, including cases with infinitely many solutions or no solutions as well as cases requiring algebraic manipulation using properties of operations. Coefficients and constants in these equations may be any rational numbers. **Examples of Opportunities for In-Depth Focus** This is a culminating standard for solving one-variable linear equations.
	Analyze and solve pairs of simultaneous linear equations. a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously. b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by

MAFS.8.EE.3.8:	inspection. *For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6.* c. Solve real-world and mathematical problems leading to two linear equations in two variables. *For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.* **Clarifications:** **Examples of Opportunities for In-Depth Focus** When students work toward meeting this standard, they build on what they know about two-variable linear equations, and they enlarge the varieties of real-world and mathematical problems they can solve.
MAFS.8.F.1.1:	Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.
MAFS.8.F.1.2:	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.* **Clarifications:** **Examples of Opportunities for In-Depth Focus** Work toward meeting this standard repositions previous work with tables and graphs in the new context of input/output rules.
MAFS.8.F.1.3:	Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. *For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.*
MAFS.8.F.2.4:	Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.
MAFS.8.F.2.5:	Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.
MAFS.8.G.1.1:	Verify experimentally the properties of rotations, reflections, and translations: a. Lines are taken to lines, and line segments to line segments of the same length. b. Angles are taken to angles of the same measure. c. Parallel lines are taken to parallel lines.
MAFS.8.G.1.2:	Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.
MAFS.8.G.1.3:	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.
MAFS.8.G.1.4:	Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.
MAFS.8.G.1.5:	Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. *For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.*
MAFS.8.G.2.6:	Explain a proof of the Pythagorean Theorem and its converse.
MAFS.8.G.2.7:	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. **Clarifications:** **Examples of Opportunities for In-Depth Focus** The Pythagorean theorem is useful in practical problems, relates to grade-level work in irrational numbers and plays an important role mathematically in coordinate geometry in high school.
MAFS.8.G.2.8:	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.
MAFS.8.G.3.9:	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems. **Clarifications:** **Fluency Expectations or Examples of Culminating Standards** When students learn to solve problems involving volumes of cones, cylinders, and spheres — together with their previous grade 7 work in angle measure, area, surface area and volume (7.G.2.4–2.6) — they will have acquired a well-developed set of geometric measurement skills. These skills, along with proportional reasoning (7.RP) and multistep numerical problem solving (7.EE.2.3), can be combined and used in flexible ways as part of modeling during high school — not to mention after high school for college and careers.
MAFS.8.NS.1.1:	Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.
MAFS.8.NS.1.2:	Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2). *For example, by truncating the decimal expansion of $\sqrt{2}$, show that $\sqrt{2}$ is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.*
MAFS.8.SP.1.1:	Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.
MAFS.8.SP.1.2:	Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.
MAFS.8.SP.1.3:	Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. *For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.*
	Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way

MAFS.8.SP.1.4:	table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. *For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?*
MAFS.K12.MP.1.1:	**Make sense of problems and persevere in solving them.** Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
MAFS.K12.MP.2.1:	**Reason abstractly and quantitatively**. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
MAFS.K12.MP.3.1:	**Construct viable arguments and critique the reasoning of others.** Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
MAFS.K12.MP.4.1:	**Model with mathematics.** Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
MAFS.K12.MP.5.1:	**Use appropriate tools strategically.** Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
MAFS.K12.MP.6.1:	**Attend to precision.** Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
MAFS.K12.MP.7.1:	**Look for and make use of structure.** Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
	Look for and express regularity in repeated reasoning.

MAFS.K12.MP.8.1:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y – 2)/(x – 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x – 1)(x + 1)$, $(x – 1)(x^2 + x + 1)$, and $(x – 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
LAFS.68.RST.1.3:	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
LAFS.68.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.
LAFS.68.RST.3.7:	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
LAFS.68.WHST.1.1:	Write arguments focused on *discipline-specific content.* a. Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically. b. Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources. c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence. d. Establish and maintain a formal style. e. Provide a concluding statement or section that follows from and supports the argument presented.
LAFS.68.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.7.SL.1.1:	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others' ideas and expressing their own clearly. a. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion. b. Follow rules for collegial discussions, track progress toward specific goals and deadlines, and define individual roles as needed. c. Pose questions that elicit elaboration and respond to others' questions and comments with relevant observations and ideas that bring the discussion back on topic as needed. d. Acknowledge new information expressed by others and, when warranted, modify their own views.
LAFS.7.SL.1.2:	Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study.
LAFS.7.SL.1.3:	Delineate a speaker's argument and specific claims, evaluating the soundness of the reasoning and the relevance and sufficiency of the evidence.
LAFS.7.SL.2.4:	Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use appropriate eye contact, adequate volume, and clear pronunciation.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

GENERAL NOTES

MAFS.7

In this Grade 7 Advanced Mathematics course, instructional time should focus on five critical area: (1) solving problems involving scale drawings and informal geometric constructions, and working with two- and three-dimensional shapes to solve problems involving area, surface area, and volume; (2) drawing inferences about populations based on samples; (3) formulating and reasoning about expressions and equations, including modeling an association in bivariate data with a linear equation, and solving linear equations and systems of linear equations; (4) grasping the concept of a function and using functions to describe quantitative relationships; and (5) analyzing two- and three-dimensional space and figures using distance, angle, similarity, and congruence, and understanding and applying the Pythagorean Theorem.

1. Students continue their work with area from Grade 6, solving problems involving area and circumference of a circle and surface area of three-dimensional objects. In preparation for work on congruence and similarity in Grade 8 they reason about relationships among two-dimensional figures using scale drawings and informal geometric constructions, and they gain familiarity with the relationship between angles formed by intersecting lines. Students work with three-dimensional figures, relating them to two-dimensional figures by examining cross-sections. They solve real-world and mathematical problems involving area, surface area, and volume of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes and right prisms.
2. Students build on their previous work with single data distributions to compare two data distributions and address questions about difference between populations. They begin informal work with random sampling to generate data sets and learn about the importance of representative samples for drawing inferences.
3. Students use linear equations and systems of linear equations to represent, analyze, and solve a variety of problems. Students recognize equations for proportions ($y/x = m$ or $y = mx$) as special linear equations ($y = mx + b$), understanding that the constant of proportionality (m) is the slope, and the graphs are lines through the origin. They understand that the slope (m) of a line is a constant rate of change, so that if the input or x-coordinate changes by an amount A, the output or y-coordinate changes by the amount m(A). Students also use a linear equation to describe the association between two quantities in bivariate data (such as arm span vs. height for students in a classroom). At this grade, fitting the model, and assessing its fit to the data are done informally. Interpreting the model in the context of the data requires students to express a relationship between the two quantities in question and to interpret components of the relationship (such as slope and y-intercept) in terms of the situation.

   Students strategically choose and efficiently implement procedures to solve linear equations in one variable, understanding that when they use the properties of equality and concept of logical equivalence, they maintain the solutions of the original equation. Students solve systems of two linear equations in two variables and relate the systems to pairs of lines in the plane; these intersect, are parallel, or are the same line. Students use linear equations, systems of linear equations, linear functions, and their understanding of slope of a line to analyze situations and solve problems.

4. Students grasp the concept of a function as a rule that assigns to each input exactly one output. They understand that functions describe situations where one quantity determines another. They can translate among representations and partial representations of functions (noting that tabular and graphical representations may be partial representations), and they describe how aspects of the function are reflected in the different representations.
5. Students use ideas about distance and angles, how they behave under translations, rotations, reflections, and dilation, and ideas about congruence and similarity to describe and analyze two-dimensional figures and to solve problems. Students show that the sum of the angles in a triangle is the angle formed by a straight line, and that various configurations of lines give rise to similar triangles because of the angles created when a traversal cuts parallel lines. Students understand the statement of the Pythagorean Theorem and its converse, and can explain why the Pythagorean Theorem holds, for example, by decomposing a square in two different ways. They apply the Pythagorean Theorem to find distances between points on the coordinate plane, to find lengths, and to analyze polygons. Students complete their work on volume by solving problems involving cones, cylinders, and spheres.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

Additional Instructional Resources:
A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGI/cms/review.html?Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

Florida Standards Implementation Guide Focus Section:

The Mathematics Florida Standards Implementation Guide (found at https://www.fldoe.org/academics/standards/subject-areas/math-science/mathematics/fsig.stml) was created to support the teaching and learning of the Mathematics Florida Standards. The guide is compartmentalized into three components: focus, coherence, and rigor. Focus means narrowing the scope of content in each grade or course, so students achieve higher levels of understanding and experience math concepts more deeply. The Mathematics standards allow for the teaching and learning of mathematical concepts focused around major clusters at each grade level, enhanced by supporting and additional clusters. The major, supporting and additional clusters are identified, in relation to each grade or course. The cluster designations for this course are below.

Major Clusters

MAFS.7.EE.2 Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

MAFS.8.EE.1 Work with radicals and integer exponents.

MAFS.8.EE.2 Understand the connections between proportional relationships, lines, and linear equations.

MAFS.8.EE.3 Analyze and solve linear equations and pairs of simultaneous linear equations.

MAFS.8.F.1 Define, evaluate, and compare functions.

MAFS.8.F.2 Use functions to model relationships between quantities.

MAFS.8.G.1 Understand congruence and similarity using physical models, transparencies, or geometry software.

MAFS.8.G.2 Understand and apply the Pythagorean Theorem.

Supporting Clusters

MAFS.7.SP.1 Use random sampling to draw inferences about a population.

MAFS.7.SP.3 Investigate chance processes and develop, use, and evaluate probability models.

MAFS.8.NS.1 Know that there are numbers that are not rational, and approximate them by rational numbers.

MAFS.8.SP.1 Investigate patterns of association in bivariate data.

Additional Clusters

MAFS.7.G.1 Draw, construct, and describe geometrical figures and describe the relationships between them.

MAFS.7.G.2 Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.

MAFS.7.SP.2 Draw informal comparative inferences about two populations.

MAFS.G.3 Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.

Note: Clusters should not be sorted from major to supporting and then taught in that order. To do so would strip the coherence of the mathematical ideas and miss the opportunity to enhance the major work of the grade with the supporting and additional clusters.

GENERAL INFORMATION

Course Number: 1205050

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 6 to 8 Education Courses > **Subject:** Mathematics > **SubSubject:** General Mathematics >

Abbreviated Title: M/J ACCEL MATH GR 7

Course Length: Year (Y)

Course Attributes:

- Class Size Core Required

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 7

Educator Certifications

Mathematics (Grades 6-12)
Middle Grades Mathematics (Middle Grades 5-9)
Middle Grades Integrated Curriculum (Middle Grades 5-9)

M/J Accelerated Mathematics Grade 7 (#1205050) 2022 - And Beyond

Course Standards

Name	Description
MA.7.AR.2.2:	Write and solve two-step equations in one variable within a mathematical or real-world context, where all terms are rational numbers. **Clarifications:** *Clarification 1:* Instruction focuses the application of the properties of equality. Refer to Properties of Operations, Equality and Inequality (Appendix D). *Clarification 2:* Instruction includes equations in the forms $px\pm q=r$ and $p(x\pm q)=r$, where p, q and r are specific rational numbers. *Clarification 3:* Problems include linear equations where the variable may be on either side of the equal sign.
MA.7.AR.3.3:	Solve mathematical and real-world problems involving the conversion of units across different measurement systems.
MA.7.AR.4.1:	Determine whether two quantities have a proportional relationship by examining a table, graph or written description. **Clarifications:** *Clarification 1:* Instruction focuses on the connection to ratios and on the constant of proportionality, which is the ratio between two quantities in a proportional relationship.
MA.7.AR.4.2:	Determine the constant of proportionality within a mathematical or real-world context given a table, graph or written description of a proportional relationship.
MA.7.AR.4.3:	Given a mathematical or real-world context, graph proportional relationships from a table, equation or a written description. **Clarifications:** *Clarification 1:* Instruction includes equations of proportional relationships in the form of $y=px$, where p is the constant of proportionality.
MA.7.AR.4.4:	Given any representation of a proportional relationship, translate the representation to a written description, table or equation. **Clarifications:** *Clarification 1:* Given representations are limited to a written description, graph, table or equation. *Clarification 2:* Instruction includes equations of proportional relationships in the form of $y=px$, where p is the constant of proportionality.
MA.7.AR.4.5:	Solve real-world problems involving proportional relationships.
MA.7.DP.1.4:	Use proportional reasoning to construct, display and interpret data in circle graphs. **Clarifications:** *Clarification 1:* Data is limited to no more than 6 categories.
MA.7.DP.1.5:	Given a real-world numerical or categorical data set, choose and create an appropriate graphical representation. **Clarifications:** *Clarification 1:* Graphical representations are limited to histograms, bar charts, circle graphs, line plots, box plots and stem-and-leaf plots.
MA.7.GR.1.3:	Explore the proportional relationship between circumferences and diameters of circles. Apply a formula for the circumference of a circle to solve mathematical and real-world problems. **Clarifications:** *Clarification 1:* Instruction includes the exploration and analysis of circular objects to examine the proportional relationship between circumference and diameter and arrive at an approximation of pi (π) as the constant of proportionality. *Clarification 2:* Solutions may be represented in terms of pi (π) or approximately.
MA.7.GR.1.4:	Explore and apply a formula to find the area of a circle to solve mathematical and real-world problems. **Clarifications:** *Clarification 1:* Instruction focuses on the connection between formulas for the area of a rectangle and the area of a circle. *Clarification 2:* Problem types include finding areas of fractional parts of a circle. *Clarification 3:* Solutions may be represented in terms of pi (π) or approximately.
MA.7.GR.1.5:	Solve mathematical and real-world problems involving dimensions and areas of geometric figures, including scale drawings and scale factors. **Clarifications:** *Clarification 1:* Instruction focuses on seeing the scale factor as a constant of proportionality between corresponding lengths in the scale drawing and the original object. *Clarification 2:* Instruction includes the understanding that if the scaling factor is k, then the constant of proportionality between corresponding areas is k^2 . *Clarification 3:* Problem types include finding the scale factor given a set of dimensions as well as finding dimensions when given a scale factor.
	Given a mathematical or real-world context, find the surface area of a right circular cylinder using the figure's net. **Clarifications:** *Clarification 1:* Instruction focuses on representing a right circular cylinder with its net and on the connection between surface area of a figure

MA.7.GR.2.1:	and its net. *Clarification 2:* Within this benchmark, the expectation is to find the surface area when given a net or when given a three-dimensional figure. *Clarification 3:* Within this benchmark, the expectation is not to memorize the surface area formula for a right circular cylinder. Clarification 4: Solutions may be represented in terms of pi (π) or approximately.
MA.7.GR.2.2:	Solve real-world problems involving surface area of right circular cylinders. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is not to memorize the surface area formula for a right circular cylinder or to find radius as a missing dimension. *Clarification 2:* Solutions may be represented in terms of pi (π) or approximately.
MA.7.GR.2.3:	Solve mathematical and real-world problems involving volume of right circular cylinders. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is not to memorize the volume formula for a right circular cylinder or to find radius as a missing dimension. *Clarification 2:* Solutions may be represented in terms of pi (π) or approximately.
MA.7.NSO.1.1:	Know and apply the Laws of Exponents to evaluate numerical expressions and generate equivalent numerical expressions, limited to whole-number exponents and rational number bases. **Clarifications:** *Clarification 1:* Instruction focuses on building the Laws of Exponents from specific examples. Refer to the K-12 Formulas (Appendix E) for the Laws of Exponents. *Clarification 2:* Problems in the form $\frac{a^n}{a^m} = a^p$ must result in a whole-number value for p.
MA.7.NSO.1.2:	Rewrite rational numbers in different but equivalent forms including fractions, mixed numbers, repeating decimals and percentages to solve mathematical and real-world problems.
MA.8.AR.1.1:	Apply the Laws of Exponents to generate equivalent algebraic expressions, limited to integer exponents and monomial bases. **Clarifications:** *Clarification 1:* Refer to the K-12 Formulas (Appendix E) for the Laws of Exponents.
MA.8.AR.1.2:	Apply properties of operations to multiply two linear expressions with rational coefficients. **Clarifications:** *Clarification 1:* Problems are limited to products where at least one of the factors is a monomial. *Clarification 2:* Refer to Properties of Operations, Equality and Inequality (Appendix D).
MA.8.AR.1.3:	Rewrite the sum of two algebraic expressions having a common monomial factor as a common factor multiplied by the sum of two algebraic expressions.
MA.8.AR.2.1:	Solve multi-step linear equations in one variable, with rational number coefficients. Include equations with variables on both sides. **Clarifications:** *Clarification 1:* Problem types include examples of one-variable linear equations that generate one solution, infinitely many solutions or no solution.
MA.8.AR.2.2:	Solve two-step linear inequalities in one variable and represent solutions algebraically and graphically. **Clarifications:** *Clarification 1:* Instruction includes inequalities in the forms $px \pm q > r$ and $p(x \pm q) > r$, where p, q and r are specific rational numbers and where any inequality symbol can be represented. *Clarification 2:* Problems include inequalities where the variable may be on either side of the inequality.
MA.8.AR.2.3:	Given an equation in the form of $x^2=p$ and $x^3=q$, where p is a whole number and q is an integer, determine the real solutions. **Clarifications:** *Clarification 1:* Instruction focuses on understanding that when solving $x^2=p$, there is both a positive and negative solution. *Clarification 2:* Within this benchmark, the expectation is to calculate square roots of perfect squares up to 225 and cube roots of perfect cubes from -125 to 125.
MA.8.AR.3.1:	Determine if a linear relationship is also a proportional relationship. **Clarifications:** *Clarification 1:* Instruction focuses on the understanding that proportional relationships are linear relationships whose graph passes through the origin. *Clarification 2:* Instruction includes the representation of relationships using tables, graphs, equations and written descriptions.
MA.8.AR.3.2:	Given a table, graph or written description of a linear relationship, determine the slope. **Clarifications:** *Clarification 1:* Problem types include cases where two points are given to determine the slope. *Clarification 2:* Instruction includes making connections of slope to the constant of proportionality and to similar triangles represented on the coordinate plane.
MA.8.AR.3.3:	Given a table, graph or written description of a linear relationship, write an equation in slope-intercept form.
MA.8.AR.3.4:	Given a mathematical or real-world context, graph a two-variable linear equation from a written description, a table or an equation in slope-intercept form.
MA.8.AR.3.5:	Given a real-world context, determine and interpret the slope and y-intercept of a two-variable linear equation from a written description, a table, a graph or an equation in slope-intercept form. **Clarifications:**

	Clarification 1: Problems include conversions with temperature and equations of lines of fit in scatter plots.
MA.8.AR.4.1:	Given a system of two linear equations and a specified set of possible solutions, determine which ordered pairs satisfy the system of linear equations. **Clarifications:** *Clarification 1:* Instruction focuses on the understanding that a solution to a system of equations satisfies both linear equations simultaneously.
MA.8.AR.4.2:	Given a system of two linear equations represented graphically on the same coordinate plane, determine whether there is one solution, no solution or infinitely many solutions.
MA.8.AR.4.3:	Given a mathematical or real-world context, solve systems of two linear equations by graphing. **Clarifications:** *Clarification 1:* Instruction includes approximating non-integer solutions. *Clarification 2:* Within this benchmark, it is the expectation to represent systems of linear equations in slope-intercept form only. *Clarification 3:* Instruction includes recognizing that parallel lines have the same slope.
MA.8.DP.1.1:	Given a set of real-world bivariate numerical data, construct a scatter plot or a line graph as appropriate for the context. **Clarifications:** *Clarification 1:* Instruction includes recognizing similarities and differences between scatter plots and line graphs, and on determining which is more appropriate as a representation of the data based on the context. *Clarification 2:* Sets of data are limited to 20 points.
MA.8.DP.1.2:	Given a scatter plot within a real-world context, describe patterns of association. **Clarifications:** *Clarification 1:* Descriptions include outliers; positive or negative association; linear or nonlinear association; strong or weak association.
MA.8.DP.1.3:	Given a scatter plot with a linear association, informally fit a straight line. **Clarifications:** *Clarification 1:* Instruction focuses on the connection to linear functions. *Clarification 2:* Instruction includes using a variety of tools, including a ruler, to draw a line with approximately the same number of points above and below the line.
MA.8.DP.2.1:	Determine the sample space for a repeated experiment. **Clarifications:** *Clarification 1:* Instruction includes recording sample spaces for repeated experiments using organized lists, tables or tree diagrams. *Clarification 2:* Experiments to be repeated are limited to tossing a fair coin, rolling a fair die, picking a card randomly from a deck with replacement, picking marbles randomly from a bag with replacement and spinning a fair spinner. *Clarification 3:* Repetition of experiments is limited to two times except for tossing a coin.
MA.8.DP.2.2:	Find the theoretical probability of an event related to a repeated experiment. **Clarifications:** *Clarification 1:* Instruction includes representing probability as a fraction, percentage or decimal. *Clarification 2:* Experiments to be repeated are limited to tossing a fair coin, rolling a fair die, picking a card randomly from a deck with replacement, picking marbles randomly from a bag with replacement and spinning a fair spinner. *Clarification 3:* Repetition of experiments is limited to two times except for tossing a coin.
MA.8.DP.2.3:	Solve real-world problems involving probabilities related to single or repeated experiments, including making predictions based on theoretical probability. **Clarifications:** *Clarification 1:* Instruction includes making connections to proportional relationships and representing probability as a fraction, percentage or decimal. *Clarification 2:* Experiments to be repeated are limited to tossing a fair coin, rolling a fair die, picking a card randomly from a deck with replacement, picking marbles randomly from a bag with replacement and spinning a fair spinner. *Clarification 3:* Repetition of experiments is limited to two times except for tossing a coin.
MA.8.F.1.1:	Given a set of ordered pairs, a table, a graph or mapping diagram, determine whether the relationship is a function. Identify the domain and range of the relation. **Clarifications:** *Clarification 1:* Instruction includes referring to the input as the independent variable and the output as the dependent variable. *Clarification 2:* Within this benchmark, it is the expectation to represent domain and range as a list of numbers or as an inequality.
MA.8.F.1.2:	Given a function defined by a graph or an equation, determine whether the function is a linear function. Given an input-output table, determine whether it could represent a linear function. **Clarifications:** *Clarification 1:* Instruction includes recognizing that a table may not determine a function.
MA.8.F.1.3:	Analyze a real-world written description or graphical representation of a functional relationship between two quantities and identify where the function is increasing, decreasing or constant. **Clarifications:** *Clarification 1:* Problem types are limited to continuous functions. *Clarification 2:* Analysis includes writing a description of a graphical representation or sketching a graph from a written description.
	Apply the Pythagorean Theorem to solve mathematical and real-world problems involving unknown side lengths in right triangles. **Clarifications:**

MA.8.GR.1.1:	*Clarification 1:* Instruction includes exploring right triangles with natural-number side lengths to illustrate the Pythagorean Theorem. *Clarification 2:* Within this benchmark, the expectation is to memorize the Pythagorean Theorem. *Clarification 3:* Radicands are limited to whole numbers up to 225.
MA.8.GR.1.2:	Apply the Pythagorean Theorem to solve mathematical and real-world problems involving the distance between two points in a coordinate plane. **Clarifications:** *Clarification 1:* Instruction includes making connections between distance on the coordinate plane and right triangles. *Clarification 2:* Within this benchmark, the expectation is to memorize the Pythagorean Theorem. It is not the expectation to use the distance formula. *Clarification 3:* Radicands are limited to whole numbers up to 225.
MA.8.GR.1.3:	Use the Triangle Inequality Theorem to determine if a triangle can be formed from a given set of sides. Use the converse of the Pythagorean Theorem to determine if a right triangle can be formed from a given set of sides.
MA.8.GR.1.4:	Solve mathematical problems involving the relationships between supplementary, complementary, vertical or adjacent angles.
MA.8.GR.1.5:	Solve problems involving the relationships of interior and exterior angles of a triangle. **Clarifications:** *Clarification 1:* Problems include using the Triangle Sum Theorem and representing angle measures as algebraic expressions.
MA.8.GR.1.6:	Develop and use formulas for the sums of the interior angles of regular polygons by decomposing them into triangles. **Clarifications:** *Clarification 1:* Problems include representing angle measures as algebraic expressions.
MA.8.GR.2.1:	Given a preimage and image generated by a single transformation, identify the transformation that describes the relationship. **Clarifications:** *Clarification 1:* Within this benchmark, transformations are limited to reflections, translations or rotations of images. *Clarification 2:* Instruction focuses on the preservation of congruence so that a figure maps onto a copy of itself.
MA.8.GR.2.2:	Given a preimage and image generated by a single dilation, identify the scale factor that describes the relationship. **Clarifications:** *Clarification 1:* Instruction includes the connection to scale drawings and proportions. *Clarification 2:* Instruction focuses on the preservation of similarity and the lack of preservation of congruence when a figure maps onto a scaled copy of itself, unless the scaling factor is 1.
MA.8.GR.2.3:	Describe and apply the effect of a single transformation on two-dimensional figures using coordinates and the coordinate plane. **Clarifications:** *Clarification 1:* Within this benchmark, transformations are limited to reflections, translations, rotations or dilations of images. *Clarification 2:* Lines of reflection are limited to the x-axis, y-axis or lines parallel to the axes. *Clarification 3:* Rotations must be about the origin and are limited to 90°, 180°, 270° or 360°. *Clarification 4:* Dilations must be centered at the origin.
MA.8.GR.2.4:	Solve mathematical and real-world problems involving proportional relationships between similar triangles.
MA.8.NSO.1.1:	Extend previous understanding of rational numbers to define irrational numbers within the real number system. Locate an approximate value of a numerical expression involving irrational numbers on a number line. **Clarifications:** *Clarification 1:* Instruction includes the use of number line and rational number approximations, and recognizing pi (π) as an irrational number. *Clarification 2:* Within this benchmark, the expectation is to approximate numerical expressions involving one arithmetic operation and estimating square roots or pi (π).
MA.8.NSO.1.2:	Plot, order and compare rational and irrational numbers, represented in various forms. **Clarifications:** *Clarification 1:* Within this benchmark, it is not the expectation to work with the number e. *Clarification 2:* Within this benchmark, the expectation is to plot, order and compare square roots and cube roots. *Clarification 3:* Within this benchmark, the expectation is to use symbols (<, > or =).
MA.8.NSO.1.3:	Extend previous understanding of the Laws of Exponents to include integer exponents. Apply the Laws of Exponents to evaluate numerical expressions and generate equivalent numerical expressions, limited to integer exponents and rational number bases, with procedural fluency. **Clarifications:** *Clarification 1:* Refer to the K-12 Formulas (Appendix E) for the Laws of Exponents.
MA.8.NSO.1.4:	Express numbers in scientific notation to represent and approximate very large or very small quantities. Determine how many times larger or smaller one number is compared to a second number.
MA.8.NSO.1.5:	Add, subtract, multiply and divide numbers expressed in scientific notation with procedural fluency. **Clarifications:** *Clarification 1:* Within this benchmark, for addition and subtraction with numbers expressed in scientific notation, exponents are limited to within 2 of each other.
MA.8.NSO.1.6:	Solve real-world problems involving operations with numbers expressed in scientific notation. **Clarifications:** *Clarification 1:* Instruction includes recognizing the importance of significant digits when physical measurements are involved. *Clarification 2:* Within this benchmark, for addition and subtraction with numbers expressed in scientific notation, exponents are limited to within 2 of each other.

MA.8.NSO.1.7:	Solve multi-step mathematical and real-world problems involving the order of operations with rational numbers including exponents and radicals. **Clarifications:** *Clarification 1:* Multi-step expressions are limited to 6 or fewer steps. *Clarification 2:* Within this benchmark, the expectation is to simplify radicals by factoring square roots of perfect squares up to 225 and cube roots of perfect cubes from -125 to 125.
MA.K12.MTR.1.1:	Mathematicians who participate in effortful learning both individually and with others: • Analyze the problem in a way that makes sense given the task. • Ask questions that will help with solving the task. • Build perseverance by modifying methods as needed while solving a challenging task. • Stay engaged and maintain a positive mindset when working to solve tasks. • Help and support each other when attempting a new method or approach. **Clarifications:** Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: • Build understanding through modeling and using manipulatives. • Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. • Progress from modeling problems with objects and drawings to using algorithms and equations. • Express connections between concepts and representations. • Choose a representation based on the given context or purpose. **Clarifications:** Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations. **Clarifications:** Teachers who encourage students to complete tasks with mathematical fluency: • Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. • Offer multiple opportunities for students to practice efficient and generalizable methods. • Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: • Communicate mathematical ideas, vocabulary and methods effectively. • Analyze the mathematical thinking of others. • Compare the efficiency of a method to those expressed by others. • Recognize errors and suggest how to correctly solve the task. • Justify results by explaining methods and processes. • Construct possible arguments based on evidence. **Clarifications:** Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. **Clarifications:**

	Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. **Clarifications:** Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems. • Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. **Clarifications:** Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. **Clarifications:** K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. **Clarifications:** See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. **Clarifications:** Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. **Clarifications:** In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think _______ because ______." The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. **Clarifications:** Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. **Clarifications:** In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends

	differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

General Course Information and Notes

VERSION DESCRIPTION

In grade 7 accelerated, instructional time will emphasize six areas: (1) representing numbers in scientific notation and extending the set of numbers to the system of real numbers, which includes irrational numbers; (2) generating equivalent numeric and algebraic expressions including using the Laws of Exponents; (3) creating and reasoning about linear relationships including modeling an association in bivariate data with a linear equation; (4) solving linear equations, inequalities and systems of linear equations; (5) developing an understanding of the concept of a function and (6) analyzing two-dimensional figures, particularly triangles, using distance, angle and applying the Pythagorean Theorem.

Curricular content for all subjects must integrate critical-thinking, problem-solving, and workforce-literacy skills; communication, reading, and writing skills; mathematics skills; collaboration skills; contextual and applied-learning skills; technology-literacy skills; information and media-literacy skills; and civic-engagement skills.

GENERAL NOTES

Honors and Accelerated Level Course Note: Accelerated courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards
This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:
https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Number: 1205050

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 6 to 8 Education Courses > **Subject:** Mathematics > **SubSubject:** General Mathematics >

Abbreviated Title: M/J ACCEL MATH GR 7

Course Length: Year (Y)

Course Attributes:

- Honors
- Class Size Core Required

Course Type: Core Academic Course

Course Level: 3

Course Status: State Board Approved

Grade Level(s): 7

Educator Certifications

Mathematics (Grades 6-12)
Middle Grades Mathematics (Middle Grades 5-9)

M/J Mathematics 2 Cambridge Lower Secondary (#1205055) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

AICE COURSE DESCRIPTION

For more information about this Cambridge course, visit http://www.cie.org.uk/programmes-and-qualifications/cambridge-secondary-1/cambridge-secondary-1/curriculum/.

GENERAL INFORMATION

Course Number: 1205055

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 6 to 8 Education Courses > **Subject:** Mathematics > **SubSubject:** General Mathematics >

Abbreviated Title: M/J MATH 2 CLS

Course Length: Year (Y)

Course Attributes:

- Advanced International Certificate of Education (AICE)

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 6,7,8

Educator Certifications

Mathematics (Elementary Grades 1-6)
Middle Grades Mathematics (Middle Grades 5-9)
Mathematics (Grades 6-12)
Middle Grades Integrated Curriculum (Middle Grades 5-9)

M/J Mathematics 3 Cambridge Lower Secondary (#1205060) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

AICE COURSE DESCRIPTION

For more information about this Cambridge course, visit http://www.cie.org.uk/programmes-and-qualifications/cambridge-secondary-1/cambridge-secondary-1/curriculum/.

GENERAL INFORMATION

Course Number: 1205060

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 6 to 8 Education Courses > **Subject:** Mathematics > **SubSubject:** General Mathematics >

Abbreviated Title: M/J MATH 3 CLS

Course Length: Year (Y)

Course Attributes:

- Advanced International Certificate of Education (AICE)

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 6,7,8

Educator Certifications

Mathematics (Elementary Grades 1-6)
Middle Grades Integrated Curriculum (Middle Grades 5-9)
Middle Grades Mathematics (Middle Grades 5-9)
Mathematics (Grades 6-12)

M/J Grade 8 Pre-Algebra (#1205070) 2015 - 2022 (current)

Course Standards

Name	Description
MAFS.8.EE.1.1:	Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example, 3^2 × □ = □ = $1/3^3$ = 1/27.*
MAFS.8.EE.1.2:	Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational.
MAFS.8.EE.1.3:	Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. *For example, estimate the population of the United States as 3 × □ and the population of the world as 7 × □, and determine that the world population is more than 20 times larger.*
MAFS.8.EE.1.4:	Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.
MAFS.8.EE.2.5:	Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. *For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.* **Clarifications:** **Examples of Opportunities for In-Depth Focus** When students work toward meeting this standard, they build on grades 6–7 work with proportions and position themselves for grade 8 work with functions and the equation of a line.
MAFS.8.EE.2.6:	Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation y = mx for a line through the origin and the equation y = mx + b for a line intercepting the vertical axis at b.
MAFS.8.EE.3.7:	Solve linear equations in one variable. a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form x = a, a = a, or a = b results (where a and b are different numbers). b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms. **Clarifications:** **Fluency Expectations or Examples of Culminating Standards** Students have been working informally with one-variable linear equations since as early as kindergarten. This important line of development culminates in grade 8 with the solution of general one-variable linear equations, including cases with infinitely many solutions or no solutions as well as cases requiring algebraic manipulation using properties of operations. Coefficients and constants in these equations may be any rational numbers. **Examples of Opportunities for In-Depth Focus** This is a culminating standard for solving one-variable linear equations.
MAFS.8.EE.3.8:	Analyze and solve pairs of simultaneous linear equations. a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously. b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. *For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6.* c. Solve real-world and mathematical problems leading to two linear equations in two variables. *For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.* **Clarifications:** **Examples of Opportunities for In-Depth Focus** When students work toward meeting this standard, they build on what they know about two-variable linear equations, and they enlarge the varieties of real-world and mathematical problems they can solve.
MAFS.8.F.1.1:	Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.
MAFS.8.F.1.2:	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.* **Clarifications:** **Examples of Opportunities for In-Depth Focus** Work toward meeting this standard repositions previous work with tables and graphs in the new context of input/output rules.
	Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. *For*

MAFS.8.F.1.3:	*example, the function A = s² giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.*
MAFS.8.F.2.4:	Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.
MAFS.8.F.2.5:	Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.
MAFS.8.G.1.1:	Verify experimentally the properties of rotations, reflections, and translations: a. Lines are taken to lines, and line segments to line segments of the same length. b. Angles are taken to angles of the same measure. c. Parallel lines are taken to parallel lines.
MAFS.8.G.1.2:	Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.
MAFS.8.G.1.3:	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.
MAFS.8.G.1.4:	Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.
MAFS.8.G.1.5:	Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. *For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.*
MAFS.8.G.2.6:	Explain a proof of the Pythagorean Theorem and its converse.
MAFS.8.G.2.7:	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. **Clarifications:** **Examples of Opportunities for In-Depth Focus** The Pythagorean theorem is useful in practical problems, relates to grade-level work in irrational numbers and plays an important role mathematically in coordinate geometry in high school.
MAFS.8.G.2.8:	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.
MAFS.8.G.3.9:	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems. **Clarifications:** **Fluency Expectations or Examples of Culminating Standards** When students learn to solve problems involving volumes of cones, cylinders, and spheres — together with their previous grade 7 work in angle measure, area, surface area and volume (7.G.2.4–2.6) — they will have acquired a well-developed set of geometric measurement skills. These skills, along with proportional reasoning (7.RP) and multistep numerical problem solving (7.EE.2.3), can be combined and used in flexible ways as part of modeling during high school — not to mention after high school for college and careers.
MAFS.8.NS.1.1:	Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.
MAFS.8.NS.1.2:	Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2). *For example, by truncating the decimal expansion of √2, show that √2 is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.*
MAFS.8.SP.1.1:	Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.
MAFS.8.SP.1.2:	Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.
MAFS.8.SP.1.3:	Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. *For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.*
MAFS.8.SP.1.4:	Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. *For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?*
MAFS.K12.MP.1.1:	**Make sense of problems and persevere in solving them.** Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
MAFS.K12.MP.2.1:	**Reason abstractly and quantitatively**. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of

	quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
MAFS.K12.MP.3.1:	**Construct viable arguments and critique the reasoning of others.** Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
MAFS.K12.MP.4.1:	**Model with mathematics.** Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
MAFS.K12.MP.5.1:	**Use appropriate tools strategically.** Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
MAFS.K12.MP.6.1:	**Attend to precision.** Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
MAFS.K12.MP.7.1:	**Look for and make use of structure.** Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
MAFS.K12.MP.8.1:	**Look for and express regularity in repeated reasoning.** Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
LAFS.68.RST.1.3:	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
LAFS.68.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.
LAFS.68.RST.3.7:	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
LAFS.68.WHST.1.1:	Write arguments focused on *discipline-specific content.* a. Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically. b. Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources. c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence. d. Establish and maintain a formal style. e. Provide a concluding statement or section that follows from and supports the argument presented.

LAFS.68.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.8.SL.1.1:	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly. a. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion. b. Follow rules for collegial discussions and decision-making, track progress toward specific goals and deadlines, and define individual roles as needed. c. Pose questions that connect the ideas of several speakers and respond to others' questions and comments with relevant evidence, observations, and ideas. d. Acknowledge new information expressed by others, and, when warranted, qualify or justify their own views in light of the evidence presented.
LAFS.8.SL.1.2:	Analyze the purpose of information presented in diverse media and formats (e.g., visually, quantitatively, orally) and evaluate the motives (e.g., social, commercial, political) behind its presentation.
LAFS.8.SL.1.3:	Delineate a speaker's argument and specific claims, evaluating the soundness of the reasoning and relevance and sufficiency of the evidence and identifying when irrelevant evidence is introduced.
LAFS.8.SL.2.4:	Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

GENERAL NOTES

Additional content addressed on the Grade 8 NAEP Mathematics assessment includes:

- Draw or sketch from a written description polygons, circles, or semicircles. (MAFS.7.G.1.2; include circles and semicircles)
- Represent or describe a three-dimensional situation in a two-dimensional drawing from different views. (MAFS.6.G.1.4)
- Demonstrate an understanding about the two- and three-dimensional shapes in our world through identifying, drawing, modeling, building, or taking apart. (MAFS.6.G.1.4, MAFS.7.G.1.3, MAFS.7.G.2.6)
- Visualize or describe the cross section of a solid. (MAFS.7.G.1.3)
- Represent geometric figures using rectangular coordinates on a plane. (MAFS.6.G.1.3)
- Describe how mean, median, mode, range, or interquartile ranges relate to distribution shape. (MAFS.6.SP.2.5c)
- Using appropriate statistical measures, compare two or more data sets describing the same characteristic for two different populations for subset of the same population. (MAFS.7.SP.2.3, MAFS.7.SP.2.4)
- Given a sample, identify possible sources of bias in sampling. (MAFS.7.SP.1.1)
- Distinguish between a random and nonrandom sample. (MAFS.7.SP.1.1)
- Evaluate the design of an experiment. (MAFS.7.SP.1.2)
- Determine the theoretical probability of simple and compound events in familiar contexts. (MAFS.7.SP.3.8a)
- Estimate the probability of simple and compound events through experimentation or simulation. (MAFS.7.SP.3.8)
- Use theoretical probability to evaluate or predict experimental outcomes. (MAFS.7.SP.3.6, MAFS.SP.3.7)
- Describe relative positions of points and lines using the geometric ideas of midpoint, points on common line through a common point, parallelism, or perpendicularity.
- Describe the intersection of two or more geometric figures in the plane (e.g., intersection of a circle and a line).
- Make and test a geometric conjecture about regular polygons.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:
https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

Florida Standards Implementation Guide Focus Section:

The Mathematics Florida Standards Implementation Guide was created to support the teaching and learning of the Mathematics Florida Standards. The guide is compartmentalized into three components: focus, coherence, and rigor.Focus means narrowing the scope of content in each grade or course, so students achieve higher levels of understanding and experience math concepts more deeply. The Mathematics standards allow for the teaching and learning of mathematical concepts focused around major clusters at each grade level, enhanced by supporting and additional clusters. The major, supporting and additional clusters are identified, in relation to each grade or course. The cluster designations for this course are below.

Major Clusters

MAFS.8.EE.1 Work with radicals and integer exponents.

MAFS.8.EE.2 Understand the connections between proportional relationships, lines, and linear equations.

MAFS.8.EE.3 Analyze and solve linear equations and pairs of simultaneous linear equations.

MAFS.8.F.1 Define, evaluate, and compare functions.

MAFS.8.F.2 Use functions to model relationships between quantities.

MAFS.8.G.1 Understand congruence and similarity using physical models, transparencies, or geometry software.

MAFS.8.G.2 Understand and apply the Pythagorean Theorem.

Supporting Clusters

MAFS.8.NS.1 Know that there are numbers that are not rational, and approximate them by rational numbers.

MAFS.8.SP.1 Investigate patterns of association in bivariate data.

Additional Clusters

MAFS.G.3 Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.

Note: Clusters should not be sorted from major to supporting and then taught in that order. To do so would strip the coherence of the mathematical ideas and miss the opportunity to enhance the major work of the grade with the supporting and additional clusters.

VERSION REQUIREMENTS

In Grade 8, instructional time should focus on three critical areas: (1) formulating and reasoning about expressions and equations, including modeling an association in bivariate data with a linear equation, and solving linear equations and systems of linear equations; (2) grasping the concept of a function and using functions to describe quantitative relationships; (3) analyzing two- and three-dimensional space and figures using distance, angle, similarity, and congruence, and understanding and applying the Pythagorean Theorem.

1. Students use linear equations and systems of linear equations to represent, analyze, and solve a variety of problems. Students recognize equations for proportions (y/x = m or y = mx) as special linear equations (y = mx + b), understanding that the constant of proportionality (m) is the slope, and the graphs are lines through the origin. They understand that the slope (m) of a line is a constant rate of change, so that if the input or x-coordinate changes by an amount A, the output or y-coordinate changes by the amount m(A). Students also use a linear equation to describe the association between two quantities in bivariate data (such as arm span vs. height for students in a classroom). At this grade, fitting the model, and assessing its fit to the data are done informally. Interpreting the model in the context of the data requires students to express a relationship between the two quantities in question and to interpret components of the relationship (such as slope and y-intercept) in terms of the situation.

   Students strategically choose and efficiently implement procedures to solve linear equations in one variable, understanding that when they use the properties of equality and concept of logical equivalence, they maintain the solutions of the original equation. Students solve systems of two linear equations in two variables and relate the systems to pairs of lines in the plane; these intersect, are parallel, or are the same line. Students use linear equations, systems of linear equations, linear functions, and their understanding of slope of a line to analyze situations and solve problems.
2. Students grasp the concept of a function as a rule that assigns to each input exactly one output. They understand that functions describe situations where one quantity determines another. They can translate among representations and partial representations of functions (noting that tabular and graphical representations may be partial representations), and they describe how aspects of the function are reflected in the different representations.
3. Students use ideas about distance and angles, how they behave under translations, rotations, reflections, and dilation, and ideas about congruence and similarity to describe and analyze two-dimensional figures and to solve problems. Students show that the sum of the angles in a triangle is the angle formed by a straight line, and that various configurations of lines give rise to similar triangles because of the angles created when a traversal cuts parallel lines. Students understand the statement of the Pythagorean Theorem and its converse, and can explain why the Pythagorean Theorem holds, for example, by decomposing a square in two different ways. They apply the Pythagorean Theorem to find distances between points on the coordinate plane, to find lengths, and to analyze polygons. Students complete their work on volume by solving problems involving cones, cylinders, and spheres.

Additional Instructional Resources:
A.V.E. for Success Collection:

GENERAL INFORMATION

Course Number: 1205070

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 6 to 8 Education Courses > **Subject:** Mathematics > **SubSubject:** General Mathematics >

Abbreviated Title: M/J GRADE 8 PRE-ALG

Course Length: Year (Y)

Course Attributes:

- Class Size Core Required

Course Type: Core Academic Course

Course Level: 2

Course Status: Course Approved

Grade Level(s): 6,7,8

Educator Certifications

Mathematics (Grades 6-12)
Middle Grades Mathematics (Middle Grades 5-9)
Middle Grades Integrated Curriculum (Middle Grades 5-9)

M/J Grade 8 Pre-Algebra (#1205070) 2022 - And Beyond

Course Standards

Name	Description
MA.8.AR.1.1:	Apply the Laws of Exponents to generate equivalent algebraic expressions, limited to integer exponents and monomial bases. **Clarifications:** *Clarification 1:* Refer to the K-12 Formulas (Appendix E) for the Laws of Exponents.
MA.8.AR.1.2:	Apply properties of operations to multiply two linear expressions with rational coefficients. **Clarifications:** *Clarification 1:* Problems are limited to products where at least one of the factors is a monomial. *Clarification 2:* Refer to Properties of Operations, Equality and Inequality (Appendix D).
MA.8.AR.1.3:	Rewrite the sum of two algebraic expressions having a common monomial factor as a common factor multiplied by the sum of two algebraic expressions.
MA.8.AR.2.1:	Solve multi-step linear equations in one variable, with rational number coefficients. Include equations with variables on both sides. **Clarifications:** *Clarification 1:* Problem types include examples of one-variable linear equations that generate one solution, infinitely many solutions or no solution.
MA.8.AR.2.2:	Solve two-step linear inequalities in one variable and represent solutions algebraically and graphically. **Clarifications:** *Clarification 1:* Instruction includes inequalities in the forms $px\pm q>r$ and $p(x\pm q)>r$, where p, q and r are specific rational numbers and where any inequality symbol can be represented. *Clarification 2:* Problems include inequalities where the variable may be on either side of the inequality.
MA.8.AR.2.3:	Given an equation in the form of $x^2=p$ and $x^3=q$, where p is a whole number and q is an integer, determine the real solutions. **Clarifications:** *Clarification 1:* Instruction focuses on understanding that when solving $x^2=p$, there is both a positive and negative solution. *Clarification 2:* Within this benchmark, the expectation is to calculate square roots of perfect squares up to 225 and cube roots of perfect cubes from -125 to 125.
MA.8.AR.3.1:	Determine if a linear relationship is also a proportional relationship. **Clarifications:** *Clarification 1:* Instruction focuses on the understanding that proportional relationships are linear relationships whose graph passes through the origin. *Clarification 2:* Instruction includes the representation of relationships using tables, graphs, equations and written descriptions.
MA.8.AR.3.2:	Given a table, graph or written description of a linear relationship, determine the slope. **Clarifications:** *Clarification 1:* Problem types include cases where two points are given to determine the slope. *Clarification 2:* Instruction includes making connections of slope to the constant of proportionality and to similar triangles represented on the coordinate plane.
MA.8.AR.3.3:	Given a table, graph or written description of a linear relationship, write an equation in slope-intercept form.
MA.8.AR.3.4:	Given a mathematical or real-world context, graph a two-variable linear equation from a written description, a table or an equation in slope-intercept form.
MA.8.AR.3.5:	Given a real-world context, determine and interpret the slope and y-intercept of a two-variable linear equation from a written description, a table, a graph or an equation in slope-intercept form. **Clarifications:** *Clarification 1:* Problems include conversions with temperature and equations of lines of fit in scatter plots.
MA.8.AR.4.1:	Given a system of two linear equations and a specified set of possible solutions, determine which ordered pairs satisfy the system of linear equations. **Clarifications:** *Clarification 1:* Instruction focuses on the understanding that a solution to a system of equations satisfies both linear equations simultaneously.
MA.8.AR.4.2:	Given a system of two linear equations represented graphically on the same coordinate plane, determine whether there is one solution, no solution or infinitely many solutions.
MA.8.AR.4.3:	Given a mathematical or real-world context, solve systems of two linear equations by graphing. **Clarifications:** *Clarification 1:* Instruction includes approximating non-integer solutions. *Clarification 2:* Within this benchmark, it is the expectation to represent systems of linear equations in slope-intercept form only. *Clarification 3:* Instruction includes recognizing that parallel lines have the same slope.
	Given a set of real-world bivariate numerical data, construct a scatter plot or a line graph as appropriate for the context. **Clarifications:**

MA.8.DP.1.1:	*Clarification 1:* Instruction includes recognizing similarities and differences between scatter plots and line graphs, and on determining which is more appropriate as a representation of the data based on the context. *Clarification 2:* Sets of data are limited to 20 points.
MA.8.DP.1.2:	Given a scatter plot within a real-world context, describe patterns of association. **Clarifications:** *Clarification 1:* Descriptions include outliers; positive or negative association; linear or nonlinear association; strong or weak association.
MA.8.DP.1.3:	Given a scatter plot with a linear association, informally fit a straight line. **Clarifications:** *Clarification 1:* Instruction focuses on the connection to linear functions. *Clarification 2:* Instruction includes using a variety of tools, including a ruler, to draw a line with approximately the same number of points above and below the line.
MA.8.DP.2.1:	Determine the sample space for a repeated experiment. **Clarifications:** *Clarification 1:* Instruction includes recording sample spaces for repeated experiments using organized lists, tables or tree diagrams. *Clarification 2:* Experiments to be repeated are limited to tossing a fair coin, rolling a fair die, picking a card randomly from a deck with replacement, picking marbles randomly from a bag with replacement and spinning a fair spinner. *Clarification 3:* Repetition of experiments is limited to two times except for tossing a coin.
MA.8.DP.2.2:	Find the theoretical probability of an event related to a repeated experiment. **Clarifications:** *Clarification 1:* Instruction includes representing probability as a fraction, percentage or decimal. *Clarification 2:* Experiments to be repeated are limited to tossing a fair coin, rolling a fair die, picking a card randomly from a deck with replacement, picking marbles randomly from a bag with replacement and spinning a fair spinner. *Clarification 3:* Repetition of experiments is limited to two times except for tossing a coin.
MA.8.DP.2.3:	Solve real-world problems involving probabilities related to single or repeated experiments, including making predictions based on theoretical probability. **Clarifications:** *Clarification 1:* Instruction includes making connections to proportional relationships and representing probability as a fraction, percentage or decimal. *Clarification 2:* Experiments to be repeated are limited to tossing a fair coin, rolling a fair die, picking a card randomly from a deck with replacement, picking marbles randomly from a bag with replacement and spinning a fair spinner. *Clarification 3:* Repetition of experiments is limited to two times except for tossing a coin.
MA.8.F.1.1:	Given a set of ordered pairs, a table, a graph or mapping diagram, determine whether the relationship is a function. Identify the domain and range of the relation. **Clarifications:** *Clarification 1:* Instruction includes referring to the input as the independent variable and the output as the dependent variable. *Clarification 2:* Within this benchmark, it is the expectation to represent domain and range as a list of numbers or as an inequality.
MA.8.F.1.2:	Given a function defined by a graph or an equation, determine whether the function is a linear function. Given an input-output table, determine whether it could represent a linear function. **Clarifications:** *Clarification 1:* Instruction includes recognizing that a table may not determine a function.
MA.8.F.1.3:	Analyze a real-world written description or graphical representation of a functional relationship between two quantities and identify where the function is increasing, decreasing or constant. **Clarifications:** *Clarification 1:* Problem types are limited to continuous functions. *Clarification 2:* Analysis includes writing a description of a graphical representation or sketching a graph from a written description.
MA.8.GR.1.1:	Apply the Pythagorean Theorem to solve mathematical and real-world problems involving unknown side lengths in right triangles. **Clarifications:** *Clarification 1:* Instruction includes exploring right triangles with natural-number side lengths to illustrate the Pythagorean Theorem. *Clarification 2:* Within this benchmark, the expectation is to memorize the Pythagorean Theorem. *Clarification 3:* Radicands are limited to whole numbers up to 225.
MA.8.GR.1.2:	Apply the Pythagorean Theorem to solve mathematical and real-world problems involving the distance between two points in a coordinate plane. **Clarifications:** *Clarification 1:* Instruction includes making connections between distance on the coordinate plane and right triangles. *Clarification 2:* Within this benchmark, the expectation is to memorize the Pythagorean Theorem. It is not the expectation to use the distance formula. *Clarification 3:* Radicands are limited to whole numbers up to 225.
MA.8.GR.1.3:	Use the Triangle Inequality Theorem to determine if a triangle can be formed from a given set of sides. Use the converse of the Pythagorean Theorem to determine if a right triangle can be formed from a given set of sides.
MA.8.GR.1.4:	Solve mathematical problems involving the relationships between supplementary, complementary, vertical or adjacent angles.
	Solve problems involving the relationships of interior and exterior angles of a triangle.

MA.8.GR.1.5:	**Clarifications:** *Clarification 1:* Problems include using the Triangle Sum Theorem and representing angle measures as algebraic expressions.
MA.8.GR.1.6:	Develop and use formulas for the sums of the interior angles of regular polygons by decomposing them into triangles. **Clarifications:** *Clarification 1:* Problems include representing angle measures as algebraic expressions.
MA.8.GR.2.1:	Given a preimage and image generated by a single transformation, identify the transformation that describes the relationship. **Clarifications:** *Clarification 1:* Within this benchmark, transformations are limited to reflections, translations or rotations of images. *Clarification 2:* Instruction focuses on the preservation of congruence so that a figure maps onto a copy of itself.
MA.8.GR.2.2:	Given a preimage and image generated by a single dilation, identify the scale factor that describes the relationship. **Clarifications:** *Clarification 1:* Instruction includes the connection to scale drawings and proportions. *Clarification 2:* Instruction focuses on the preservation of similarity and the lack of preservation of congruence when a figure maps onto a scaled copy of itself, unless the scaling factor is 1.
MA.8.GR.2.3:	Describe and apply the effect of a single transformation on two-dimensional figures using coordinates and the coordinate plane. **Clarifications:** *Clarification 1:* Within this benchmark, transformations are limited to reflections, translations, rotations or dilations of images. *Clarification 2:* Lines of reflection are limited to the x-axis, y-axis or lines parallel to the axes. *Clarification 3:* Rotations must be about the origin and are limited to 90°, 180°, 270° or 360°. *Clarification 4:* Dilations must be centered at the origin.
MA.8.GR.2.4:	Solve mathematical and real-world problems involving proportional relationships between similar triangles.
MA.8.NSO.1.1:	Extend previous understanding of rational numbers to define irrational numbers within the real number system. Locate an approximate value of a numerical expression involving irrational numbers on a number line. **Clarifications:** *Clarification 1:* Instruction includes the use of number line and rational number approximations, and recognizing pi (π) as an irrational number. *Clarification 2:* Within this benchmark, the expectation is to approximate numerical expressions involving one arithmetic operation and estimating square roots or pi (π).
MA.8.NSO.1.2:	Plot, order and compare rational and irrational numbers, represented in various forms. **Clarifications:** *Clarification 1:* Within this benchmark, it is not the expectation to work with the number e. *Clarification 2:* Within this benchmark, the expectation is to plot, order and compare square roots and cube roots. *Clarification 3:* Within this benchmark, the expectation is to use symbols (<, > or =).
MA.8.NSO.1.3:	Extend previous understanding of the Laws of Exponents to include integer exponents. Apply the Laws of Exponents to evaluate numerical expressions and generate equivalent numerical expressions, limited to integer exponents and rational number bases, with procedural fluency. **Clarifications:** *Clarification 1:* Refer to the K-12 Formulas (Appendix E) for the Laws of Exponents.
MA.8.NSO.1.4:	Express numbers in scientific notation to represent and approximate very large or very small quantities. Determine how many times larger or smaller one number is compared to a second number.
MA.8.NSO.1.5:	Add, subtract, multiply and divide numbers expressed in scientific notation with procedural fluency. **Clarifications:** *Clarification 1:* Within this benchmark, for addition and subtraction with numbers expressed in scientific notation, exponents are limited to within 2 of each other.
MA.8.NSO.1.6:	Solve real-world problems involving operations with numbers expressed in scientific notation. **Clarifications:** *Clarification 1:* Instruction includes recognizing the importance of significant digits when physical measurements are involved. *Clarification 2:* Within this benchmark, for addition and subtraction with numbers expressed in scientific notation, exponents are limited to within 2 of each other.
MA.8.NSO.1.7:	Solve multi-step mathematical and real-world problems involving the order of operations with rational numbers including exponents and radicals. **Clarifications:** *Clarification 1:* Multi-step expressions are limited to 6 or fewer steps. *Clarification 2:* Within this benchmark, the expectation is to simplify radicals by factoring square roots of perfect squares up to 225 and cube roots of perfect cubes from -125 to 125.
MA.K12.MTR.1.1:	Mathematicians who participate in effortful learning both individually and with others: • Analyze the problem in a way that makes sense given the task. • Ask questions that will help with solving the task. • Build perseverance by modifying methods as needed while solving a challenging task. • Stay engaged and maintain a positive mindset when working to solve tasks. • Help and support each other when attempting a new method or approach. **Clarifications:** Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging.

	• Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: • Build understanding through modeling and using manipulatives. • Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. • Progress from modeling problems with objects and drawings to using algorithms and equations. • Express connections between concepts and representations. • Choose a representation based on the given context or purpose. **Clarifications:** Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations. **Clarifications:** Teachers who encourage students to complete tasks with mathematical fluency: • Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. • Offer multiple opportunities for students to practice efficient and generalizable methods. • Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: • Communicate mathematical ideas, vocabulary and methods effectively. • Analyze the mathematical thinking of others. • Compare the efficiency of a method to those expressed by others. • Recognize errors and suggest how to correctly solve the task. • Justify results by explaining methods and processes. • Construct possible arguments based on evidence. **Clarifications:** Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. **Clarifications:** Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. **Clarifications:** Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving.

	• Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems. • Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. **Clarifications:** Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. **Clarifications:** K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. **Clarifications:** See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. **Clarifications:** Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. **Clarifications:** In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think _______ because ______." The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. **Clarifications:** Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. **Clarifications:** In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

VERSION DESCRIPTION

The benchmarks in this course are mastery goals that students are expected to attain by the end of the year. To build mastery, students will continue to review and apply earlier grade-level benchmarks and expectations.

GENERAL NOTES

In grade 8, instructional time will emphasize six areas: (1) representing numbers in scientific notation and extending the set of numbers to the system of real numbers, which includes irrational numbers; (2) generate equivalent numeric and algebraic expressions including using the Laws of Exponents; (3) creating and reasoning about linear relationships including modeling an association in bivariate data with a linear equation; (4) solving linear equations, inequalities and systems of linear equations; (5) developing an understanding of the concept of a function and (6) analyzing two-dimensional figures, particularly triangles, using distance, angle and applying the Pythagorean Theorem.

Curricular content for all subjects must integrate critical-thinking, problem-solving, and workforce-literacy skills; communication, reading, and writing skills; mathematics skills; collaboration skills; contextual and applied-learning skills; technology-literacy skills; information and media-literacy skills; and civic-engagement skills.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:
https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Number: 1205070

Course Path: **Section:** Grades PreK to 12 Education Courses > **Grade Group:** Grades 6 to 8 Education Courses > **Subject:** Mathematics > **SubSubject:** General Mathematics >

Abbreviated Title: M/J GRADE 8 PRE-ALG

Course Length: Year (Y)

Course Type: Core Academic Course

Course Level: 2

Course Status: State Board Approved

Educator Certifications

Mathematics (Grades 6-12)
Middle Grades Mathematics (Middle Grades 5-9)
Middle Grades Integrated Curriculum (Middle Grades 5-9)

M/J International Baccalaureate MYP Mathematics 1 (#1205090) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The curriculum description for this IB course is provided at:
http://www.ibo.org/en/programmes/

GENERAL INFORMATION

Course Number: 1205090

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 6 to 8 Education Courses > **Subject:** Mathematics > **SubSubject:** General Mathematics >

Abbreviated Title: M/J IB MYP MATH 1

Course Length: Year (Y)

Course Attributes:

- International Baccalaureate (IB)

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 6,7,8

Educator Certifications

Mathematics (Elementary Grades 1-6)
Middle Grades Mathematics (Middle Grades 5-9)
Middle Grades Integrated Curriculum (Middle Grades 5-9)
Mathematics (Grades 6-12)
Elementary Education (Grades K-6)
Elementary Education (Elementary Grades 1-6)

M/J International Baccalaureate MYP Math 2 (#1205095) 2018 - And Beyond (current)

General Course Information and Notes

VERSION DESCRIPTION

The curriculum description for this IB course is provided at http://www.ibo.org/en/programmes/.

GENERAL INFORMATION

Course Number: 1205095

Course Path: **Section:** Grades PreK to 12 Education Courses > **Grade Group:** Grades 6 to 8 Education Courses > **Subject:** Mathematics > **SubSubject:** General Mathematics >

Abbreviated Title: M/J IB MYP MATH 2

Course Length: Year (Y)

Course Attributes:

- International Baccalaureate (IB)

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 6,7,8

Educator Certifications

Mathematics (Elementary Grades 1-6)
Mathematics (Grades 6-12)
Middle Grades Integrated Curriculum (Middle Grades 5-9)
Middle Grades Mathematics (Middle Grades 5-9)

M/J International Baccalaureate MYP Pre-Algebra (#1205100) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The curriculum description for this IB course is provided at:
http://www.ibo.org/en/programmes/

GENERAL INFORMATION

Course Number: 1205100

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 6 to 8 Education Courses > **Subject:** Mathematics > **SubSubject:** General Mathematics >

Abbreviated Title: M/J IB MYP PRE-ALGEB

Course Length: Year (Y)

Course Attributes:

- International Baccalaureate (IB)

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 6,7,8

Educator Certifications

Middle Grades Mathematics (Middle Grades 5-9)
Mathematics (Grades 6-12)
Middle Grades Integrated Curriculum (Middle Grades 5-9)

Algebra 1 (#1200310) 2015 - 2022 (current)

Course Standards

Name	Description
MAFS.912.A-APR.1.1:	Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. **Clarifications:** **Algebra 1 - Fluency Recommendations** Fluency in adding, subtracting, and multiplying polynomials supports students throughout their work in algebra, as well as in their symbolic work with functions. Manipulation can be more mindful when it is fluent.
MAFS.912.A-APR.2.3:	Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.
MAFS.912.A-CED.1.1:	Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational, absolute, and exponential functions. ★
MAFS.912.A-CED.1.2:	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. ★
MAFS.912.A-CED.1.3:	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.* ★
MAFS.912.A-CED.1.4:	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law V = IR to highlight resistance R.* ★
MAFS.912.A-REI.1.1:	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
MAFS.912.A-REI.2.3:	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
MAFS.912.A-REI.2.4:	Solve quadratic equations in one variable. a. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x – p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form. b. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.
MAFS.912.A-REI.3.5:	Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.
MAFS.912.A-REI.3.6:	Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
MAFS.912.A-REI.4.10:	Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).
MAFS.912.A-REI.4.11:	Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. ★
MAFS.912.A-REI.4.12:	Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.
MAFS.912.A-SSE.1.1:	Interpret expressions that represent a quantity in terms of its context. ★ a. Interpret parts of an expression, such as terms, factors, and coefficients. b. Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret as the product of P and a factor not depending on P.*
MAFS.912.A-SSE.1.2:	Use the structure of an expression to identify ways to rewrite it. *For example, see* $x^4 - y^4$ *as* $(x^2)^2 – (y^2)^2$, *thus recognizing it as a difference of squares that can be factored as* $(x^2 – y^2)(x^2 + y^2)$.
MAFS.912.A-SSE.2.3:	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.★ a. Factor a quadratic expression to reveal the zeros of the function it defines. b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. c. Use the properties of exponents to transform expressions for exponential functions. *For example the expression* 1.15^t *can be rewritten as* $(1.15^{1/12})^{12t} \approx 1.012^{12t}$ *to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.*
MAFS.912.F-BF.1.1:	Write a function that describes a relationship between two quantities. ★ a. Determine an explicit expression, a recursive process, or steps for calculation from a context. b. Combine standard function types using arithmetic operations. *For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.* c. Compose functions. *For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time.*

MAFS.912.F-BF.2.3:	Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. *Include recognizing even and odd functions from their graphs and algebraic expressions for them.*
MAFS.912.F-IF.1.1:	Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input x. The graph of f is the graph of the equation y = f(x).
MAFS.912.F-IF.1.2:	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
MAFS.912.F-IF.1.3:	Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by f(0) = f(1) = 1, f(n+1) = f(n) + f(n-1) for n ≥ 1.
MAFS.912.F-IF.2.4:	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.* ★
MAFS.912.F-IF.2.5:	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble engines in a factory, then the positive integers would be an appropriate domain for the function.* ★
MAFS.912.F-IF.2.6:	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. ★
MAFS.912.F-IF.3.7:	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★ a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift.
MAFS.912.F-IF.3.8:	Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. b. Use the properties of exponents to interpret expressions for exponential functions. *For example, identify percent rate of change in functions such as* $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)^{12t}$, $y = (1.2)^{t/10}$, *and classify them as representing exponential growth or decay.*
MAFS.912.F-IF.3.9:	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.*
MAFS.912.F-LE.1.1:	Distinguish between situations that can be modeled with linear functions and with exponential functions. ★ a. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
MAFS.912.F-LE.1.2:	Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table). ★
MAFS.912.F-LE.1.3:	Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function. ★
MAFS.912.F-LE.2.5:	Interpret the parameters in a linear or exponential function in terms of a context. ★
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★
MAFS.912.N-Q.1.2:	Define appropriate quantities for the purpose of descriptive modeling. ★ **Clarifications:** **Algebra 1 Content Notes:** Working with quantities and the relationships between them provides grounding for work with expressions, equations, and functions.
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★
MAFS.912.N-RN.1.1:	Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. *For example, we define* $5^{1/3}$ *to be the cube root of 5 because we want* $(5^{1/3})^3 = 5^{(1/3)3}$ *to hold, so* $(5^{1/3})^3$ *must equal 5.*
MAFS.912.N-RN.1.2:	Rewrite expressions involving radicals and rational exponents using the properties of exponents.
MAFS.912.N-RN.2.3:	Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.
MAFS.912.S-ID.1.1:	Represent data with plots on the real number line (dot plots, histograms, and box plots). ★ **Clarifications:** In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.2:	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. ★ **Clarifications:** In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). ★

MAFS.912.S-ID.1.3:	**Clarifications:** In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.2.5:	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. ★
MAFS.912.S-ID.2.6:	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. ★ a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. *Use given functions or choose a function suggested by the context. Emphasize linear, and exponential models.* b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association. **Clarifications:** Students take a more sophisticated look at using a linear function to model the relationship between two numerical variables. In addition to fitting a line to data, students assess how well the model fits by analyzing residuals.
MAFS.912.S-ID.3.7:	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. ★
MAFS.912.S-ID.3.8:	Compute (using technology) and interpret the correlation coefficient of a linear fit. ★
MAFS.912.S-ID.3.9:	Distinguish between correlation and causation. ★
MAFS.K12.MP.1.1:	**Make sense of problems and persevere in solving them.** Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
MAFS.K12.MP.2.1:	**Reason abstractly and quantitatively**. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
MAFS.K12.MP.3.1:	**Construct viable arguments and critique the reasoning of others.** Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
MAFS.K12.MP.4.1:	**Model with mathematics.** Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
MAFS.K12.MP.5.1:	**Use appropriate tools strategically.** Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
	Attend to precision.

MAFS.K12.MP.6.1:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
MAFS.K12.MP.7.1:	**Look for and make use of structure.** Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
MAFS.K12.MP.8.1:	**Look for and express regularity in repeated reasoning.** Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
LAFS.910.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
LAFS.910.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.
LAFS.910.RST.3.7:	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LAFS.910.SL.1.1:	Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed. c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions. d. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.
LAFS.910.SL.1.2:	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
LAFS.910.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.
LAFS.910.SL.2.4:	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
LAFS.910.WHST.1.1:	Write arguments focused on *discipline-specific content.* a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns. c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.910.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.910.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

VERSION DESCRIPTION

The fundamental purpose of this course is to formalize and extend the mathematics that students learned in the middle grades. The critical areas, called units, deepen and extend understanding of linear and exponential relationships by contrasting them with each other and by applying linear models to data that exhibit a linear trend, and students engage in methods for analyzing, solving, and using quadratic functions. The Standards for Mathematical Practice apply throughout each course, and, together with the content standards, prescribe that students experience mathematics as a coherent, useful, and logical subject that makes use of their ability to make sense of problem situations.

Unit 1- Relationships Between Quantities and Reasoning with Equations: By the end of eighth grade students have learned to solve linear equations in one variable and have applied graphical and algebraic methods to analyze and solve systems of linear equations in two variables. This unit builds on these earlier experiences by asking students to analyze and explain the process of solving an equation. Students develop fluency writing, interpreting, and translating between various forms of linear equations and inequalities, and using them to solve problems. They master the solution of linear equations and apply related solution techniques and the laws of exponents to the creation and solution of simple exponential equations. All of this work is grounded on understanding quantities and on relationships between them.

SKILLS TO MAINTAIN:
Reinforce understanding of the properties of integer exponents. The initial experience with exponential expressions, equations, and functions involves integer exponents and builds on this understanding.

Unit 2- Linear and Exponential Relationships: In earlier grades, students define, evaluate, and compare functions, and use them to model relationships between quantities. In this unit, students will learn function notation and develop the concepts of domain and range. They explore many examples of functions, including sequences; they interpret functions given graphically, numerically, symbolically, and verbally, translate between representations, and understand the limitations of various representations. Students build on and informally extend their understanding of integer exponents to consider exponential functions. They compare and contrast linear and exponential functions, distinguishing between additive and multiplicative change. Students explore systems of equations and inequalities, and they find and interpret their solutions. They interpret arithmetic sequences as linear functions and geometric sequences as exponential functions.

Unit 3- Descriptive Statistics: This unit builds upon students prior experiences with data, providing students with more formal means of assessing how a model fits data. Students use regression techniques to describe and approximate linear relationships between quantities. They use graphical representations and knowledge of the context to make judgments about the appropriateness of linear models. With linear models, they look at residuals to analyze the goodness of fit.

Unit 4- Expressions and Equations: In this unit, students build on their knowledge from unit 2, where they extended the laws of exponents to rational exponents. Students apply this new understanding of number and strengthen their ability to see structure in and create quadratic and exponential expressions. They create and solve equations, inequalities, and systems of equations involving quadratic expressions.

Unit 5- Quadratic Functions and Modeling: In this unit, students consider quadratic functions, comparing the key characteristics of quadratic functions to those of linear and exponential functions. They select from among these functions to model phenomena. Students learn to anticipate the graph of a quadratic function by interpreting various forms of quadratic expressions. In particular, they identify the real solutions of a quadratic equation as the zeros of a related quadratic function. Students expand their experience with functions to include more specialized functions, absolute value, step, and those that are piece wise-defined.

GENERAL NOTES

Fluency Recommendations

A/G- Algebra 1 students become fluent in solving characteristic problems involving the analytic geometry of lines, such as writing down the equation of a line given a point and a slope. Such fluency can support them in solving less routine mathematical problems involving linearity, as well as in modeling linear phenomena (including modeling using systems of linear inequalities in two variables).

A-APR.1- Fluency in adding, subtracting, and multiplying polynomials supports students throughout their work in Algebra, as well as in their symbolic work with functions. Manipulation can be more mindful when it is fluent.

A-SSE.1b- Fluency in transforming expressions and chunking (seeing parts of an expression as a single object) is essential in factoring, completing the square, and other mindful algebraic calculations.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:
https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

Additional Instructional Resources:
A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGI/cms/review.html?Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

Florida Standards Implementation Guide Focus Section:

The Mathematics Florida Standards Implementation Guide was created to support the teaching and learning of the Mathematics Florida Standards. The guide is compartmentalized into three components: focus, coherence, and rigor.Focus means narrowing the scope of content in each grade or course, so students achieve higher levels of understanding and experience math concepts more deeply. The Mathematics standards allow for the teaching and learning of mathematical concepts focused around major clusters at each grade level, enhanced by supporting and additional clusters. The major, supporting and additional clusters are identified, in relation to each grade or course. The cluster designations for this course are below.

Major Clusters

MAFS.912.N-RN.1 Extend the properties of exponents to rational exponents.

MAFS.912.A-APR.1 Perform arithmetic operations on polynomials.

MAFS.912.A-CED.1 Create equations that describe numbers or relationships.

MAFS.912.A-REI.1 Understand solving equations as a process of reasoning and explain the reasoning.

MAFS.912.A-REI.2 Solve equations and inequalities in one variable.

MAFS.912.A-REI.4 Represent and solve equations and inequalities graphically.

MAFS.912.A-SSE.1 Interpret the structure of expressions.

MAFS.912.F-IF.1 Understand the concept of a function and use function notation.

MAFS.912.F-IF.2 Interpret functions that arise in applications in terms of the context.

MAFS.912.S-ID.3 Interpret linear models.

Supporting Clusters

MAFS.912.N-Q.1 Reason quantitatively and use units to solve problems.

MAFS.912.A-APR.2 Understand the relationship between zeros and factors of polynomials.

MAFS.912.A-SSE.2 Write expressions in equivalent forms to solve problems.

MAFS.912.F-BF.1 Build a function that models a relationships between two quantities.

MAFS.912.F-IF.3 Analyze functions using different representations.

MAFS.912.F-LE.1 Construct and compare linear, quadratic, and exponential models and solve problems.

MAFS.912.F-LE.2 Interpret expressions for functions in terms of the situation they model.

MAFS.912.S-ID.2 Summarize, represent, and interpret data on two categorical and quantitative variables.

Additional Clusters

MAFS.912.N-RN.2 Use properties and rational and irrational numbers.

MAFS.912.A-REI.3 Solve systems of equations.

MAFS.912.F-BF.2 Build new functions from existing functions.

MAFS.912.S-ID.1 Summarize, represent, and interpret data on a single count or measurement variable.

Note: Clusters should not be sorted from major to supporting and then taught in that order. To do so would strip the coherence of the mathematical ideas and miss the opportunity to enhance the major work of the grade with the supporting and additional clusters.

GENERAL INFORMATION

Course Number: 1200310

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Algebra >

Abbreviated Title: ALG 1

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- Class Size Core Required

Course Type: Core Academic Course

Course Level: 2

Course Status: Course Approved

Grade Level(s): 9,10,11,12,30,31

Graduation Requirement: Algebra 1

Educator Certifications

Mathematics (Grades 6-12)
Middle Grades Mathematics (Middle Grades 5-9)

Equivalent Courses

1200310-Algebra 1 Equivalency start year: 2018
1200320-Algebra 1 Honors Equivalency start year: 2014
1209810-Cambridge Pre-AICE Mathematics 1 IGCSE Level Equivalency start year: 2014
1200390-International Baccalaureate Mid Yrs Prog Algebra 1 Equivalency start year: 2014

Algebra 1 (#1200310) 2022 - And Beyond

Course Standards

Name	Description
MA.912.AR.1.1:	Identify and interpret parts of an equation or expression that represent a quantity in terms of a mathematical or real-world context, including viewing one or more of its parts as a single entity. **Clarifications:** *Clarification 1:* Parts of an expression include factors, terms, constants, coefficients and variables. *Clarification 2:* Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.1.2:	Rearrange equations or formulas to isolate a quantity of interest. **Clarifications:** *Clarification 1*: Instruction includes using formulas for temperature, perimeter, area and volume; using equations for linear (standard, slope-intercept and point-slope forms) and quadratic (standard, factored and vertex forms) functions. *Clarification 2*: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.1.3:	Add, subtract and multiply polynomial expressions with rational number coefficients. **Clarifications:** *Clarification 1: I*nstruction includes an understanding that when any of these operations are performed with polynomials the result is also a polynomial. *Clarification 2:* Within the Algebra 1 course, polynomial expressions are limited to 3 or fewer terms.
MA.912.AR.1.4:	Divide a polynomial expression by a monomial expression with rational number coefficients. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, polynomial expressions are limited to 3 or fewer terms.
MA.912.AR.1.7:	Rewrite a polynomial expression as a product of polynomials over the real number system. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, polynomial expressions are limited to 4 or fewer terms with integer coefficients.
MA.912.AR.2.1:	Given a real-world context, write and solve one-variable multi-step linear equations.
MA.912.AR.2.2:	Write a linear two-variable equation to represent the relationship between two quantities from a graph, a written description or a table of values within a mathematical or real-world context. **Clarifications:** *Clarification 1:* Instruction includes the use of standard form, slope-intercept form and point-slope form, and the conversion between these forms.
MA.912.AR.2.3:	Write a linear two-variable equation for a line that is parallel or perpendicular to a given line and goes through a given point. **Clarifications:** *Clarification 1:* Instruction focuses on recognizing that perpendicular lines have slopes that when multiplied result in -1 and that parallel lines have slopes that are the same. *Clarification 2:* Instruction includes representing a line with a pair of points on the coordinate plane or with an equation. *Clarification 3:* Problems include cases where one variable has a coefficient of zero.
MA.912.AR.2.4:	Given a table, equation or written description of a linear function, graph that function, and determine and interpret its key features. **Clarifications:** *Clarification 1*: Key features are limited to domain, range, intercepts and rate of change. *Clarification 2*: Instruction includes the use of standard form, slope-intercept form and point-slope form. *Clarification 3*: Instruction includes cases where one variable has a coefficient of zero. *Clarification 4*: Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation. *Clarification 5*: Within the Algebra 1 course, notations for domain and range are limited to inequality and set-builder notations.
MA.912.AR.2.5:	Solve and graph mathematical and real-world problems that are modeled with linear functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain, range, intercepts and rate of change. *Clarification 2*: Instruction includes the use of standard form, slope-intercept form and point-slope form. *Clarification 3*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation. *Clarification 4*: Within the Algebra 1 course, notations for domain, range and constraints are limited to inequality and set-builder. *Clarification 5*: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.2.6:	Given a mathematical or real-world context, write and solve one-variable linear inequalities, including compound inequalities. Represent solutions algebraically or graphically.

MA.912.AR.2.7:	Write two-variable linear inequalities to represent relationships between quantities from a graph or a written description within a mathematical or real-world context. **Clarifications:** *Clarification 1:* Instruction includes the use of standard form, slope-intercept form and point-slope form and any inequality symbol can be represented. *Clarification 2:* Instruction includes cases where one variable has a coefficient of zero.
MA.912.AR.2.8:	Given a mathematical or real-world context, graph the solution set to a two-variable linear inequality. **Clarifications:** *Clarification 1:* Instruction includes the use of standard form, slope-intercept form and point-slope form and any inequality symbol can be represented. *Clarification 2:* Instruction includes cases where one variable has a coefficient of zero.
MA.912.AR.3.1:	Given a mathematical or real-world context, write and solve one-variable quadratic equations over the real number system. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, instruction includes the concept of non-real answers, without determining non-real solutions. *Clarification 2:* Within this benchmark, the expectation is to solve by factoring techniques, taking square roots, the quadratic formula and completing the square.
MA.912.AR.3.4:	Write a quadratic function to represent the relationship between two quantities from a graph, a written description or a table of values within a mathematical or real-world context. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, a graph, written description or table of values must include the vertex and two points that are equidistant from the vertex. *Clarification 2*: Instruction includes the use of standard form, factored form and vertex form. *Clarification 3*: Within the Algebra 2 course, one of the given points must be the vertex or an *x*-intercept.
MA.912.AR.3.5:	Given the x-intercepts and another point on the graph of a quadratic function, write the equation for the function.
MA.912.AR.3.6:	Given an expression or equation representing a quadratic function, determine the vertex and zeros and interpret them in terms of a real-world context.
MA.912.AR.3.7:	Given a table, equation or written description of a quadratic function, graph that function, and determine and interpret its key features. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior; vertex; and symmetry. *Clarification 2*: Instruction includes the use of standard form, factored form and vertex form, and sketching a graph using the zeros and vertex. *Clarification 3*: Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation. *Clarification 4*: Within the Algebra 1 course, notations for domain and range are limited to inequality and set-builder.
MA.912.AR.3.8:	Solve and graph mathematical and real-world problems that are modeled with quadratic functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior; vertex; and symmetry. *Clarification 2*: Instruction includes the use of standard form, factored form and vertex form. *Clarification 3*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation. *Clarification 4*: Within the Algebra 1 course, notations for domain, range and constraints are limited to inequality and set-builder.
MA.912.AR.4.1:	Given a mathematical or real-world context, write and solve one-variable absolute value equations.
MA.912.AR.4.3:	Given a table, equation or written description of an absolute value function, graph that function and determine its key features. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; vertex; end behavior and symmetry. *Clarification 2*: Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation. *Clarification 3*: Within the Algebra 1 course, notations for domain and range are limited to inequality and set-builder.
MA.912.AR.5.3:	Given a mathematical or real-world context, classify an exponential function as representing growth or decay. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, exponential functions are limited to the forms $f(x) = ab^x$, where *b* is a whole number greater than 1 or a unit fraction, or $f(x) = a(1 \pm r)^x$, where $0 < r < 1$.
MA.912.AR.5.4:	Write an exponential function to represent a relationship between two quantities from a graph, a written description or a table of values within a mathematical or real-world context. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, exponential functions are limited to the forms $f(x) = ab^x$, where *b* is a whole number greater than 1 or a unit fraction, or $f(x) = a(1 \pm r)^x$, where $0 < r < 1$. *Clarification 2:* Within the Algebra 1 course, tables are limited to having successive nonnegative integer inputs so that the function may be determined by finding ratios between successive outputs.
	Given a table, equation or written description of an exponential function, graph that function and determine its key features.

MA.912.AR.5.6:	**Clarifications:** *Clarification 1:* Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; constant percent rate of change; end behavior and asymptotes. *Clarification 2:* Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation. *Clarification 3:* Within the Algebra 1 course, notations for domain and range are limited to inequality and set-builder. *Clarification 4:* Within the Algebra 1 course, exponential functions are limited to the forms $f(x) = ab^x$, where *b* is a whole number greater than 1 or a unit fraction or $f(x) = a(1 \pm r)^x$, where $0 < r < 1$.
MA.912.AR.9.1:	Given a mathematical or real-world context, write and solve a system of two-variable linear equations algebraically or graphically. **Clarifications:** *Clarification 1*: Within this benchmark, the expectation is to solve systems using elimination, substitution and graphing. *Clarification 2*: Within the Algebra 1 course, the system is limited to two equations.
MA.912.AR.9.4:	Graph the solution set of a system of two-variable linear inequalities. **Clarifications:** *Clarification 1:* Instruction includes cases where one variable has a coefficient of zero. *Clarification 2:* Within the Algebra 1 course, the system is limited to two inequalities.
MA.912.AR.9.6:	Given a real-world context, represent constraints as systems of linear equations or inequalities. Interpret solutions to problems as viable or non-viable options. **Clarifications:** *Clarification 1*: Instruction focuses on analyzing a given function that models a real-world situation and writing constraints that are represented as linear equations or linear inequalities.
MA.912.DP.1.1:	Given a set of data, select an appropriate method to represent the data, depending on whether it is numerical or categorical data and on whether it is univariate or bivariate. **Clarifications:** *Clarification 1:* Instruction includes discussions regarding the strengths and weaknesses of each data display. *Clarification 2:* Numerical univariate includes histograms, stem-and-leaf plots, box plots and line plots; numerical bivariate includes scatter plots and line graphs; categorical univariate includes bar charts, circle graphs, line plots, frequency tables and relative frequency tables; and categorical bivariate includes segmented bar charts, joint frequency tables and joint relative frequency tables. *Clarification 3:* Instruction includes the use of appropriate units and labels and, where appropriate, using technology to create data displays.
MA.912.DP.1.2:	Interpret data distributions represented in various ways. State whether the data is numerical or categorical, whether it is univariate or bivariate and interpret the different components and quantities in the display. **Clarifications:** *Clarification 1*: Within the Probability and Statistics course, instruction includes the use of spreadsheets and technology.
MA.912.DP.1.3:	Explain the difference between correlation and causation in the contexts of both numerical and categorical data.
MA.912.DP.1.4:	Estimate a population total, mean or percentage using data from a sample survey; develop a margin of error through the use of simulation. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, the margin of error will be given.
MA.912.DP.2.4:	Fit a linear function to bivariate numerical data that suggests a linear association and interpret the slope and y-intercept of the model. Use the model to solve real-world problems in terms of the context of the data. **Clarifications:** *Clarification 1*: Instruction includes fitting a linear function both informally and formally with the use of technology. *Clarification 2*: Problems include making a prediction or extrapolation, inside and outside the range of the data, based on the equation of the line of fit.
MA.912.DP.2.6:	Given a scatter plot with a line of fit and residuals, determine the strength and direction of the correlation. Interpret strength and direction within a real-world context. **Clarifications:** *Clarification 1*: Instruction focuses on determining the direction by analyzing the slope and informally determining the strength by analyzing the residuals.
MA.912.DP.3.1:	Construct a two-way frequency table summarizing bivariate categorical data. Interpret joint and marginal frequencies and determine possible associations in terms of a real-world context.
MA.912.F.1.1:	Given an equation or graph that defines a function, determine the function type. Given an input-output table, determine a function type that could represent it. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, functions represented as tables are limited to linear, quadratic and exponential. *Clarification 2:* Within the Algebra 1 course, functions represented as equations or graphs are limited to vertical or horizontal translations or reflections over the x-axis of the following parent functions: $f(x) = x$, $f(x) = x^2$, $f(x) = x^3$, $f(x) = \sqrt{x}$, $f(x) = \sqrt[3]{x}$, $f(x) = \lvert x \rvert$, $f(x) = 2^x$ and $f(x) = \left(\frac{1}{2}\right)^x$.
MA.912.F.1.2:	Given a function represented in function notation, evaluate the function for an input in its domain. For a real-world context, interpret the output. **Clarifications:** *Clarification 1*: Problems include simple functions in two-variables, such as f(x,y)=3x-2y. *Clarification 2*: Within the Algebra 1 course, functions are limited to one-variable such as f(x)=3x.
	Calculate and interpret the average rate of change of a real-world situation represented graphically, algebraically or in a table over a specified

MA.912.F.1.3:	interval. **Clarifications:** *Clarification 1*: Instruction includes making the connection to determining the slope of a particular line segment.
MA.912.F.1.5:	Compare key features of linear functions each represented algebraically, graphically, in tables or written descriptions. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; slope and end behavior.
MA.912.F.1.6:	Compare key features of linear and nonlinear functions each represented algebraically, graphically, in tables or written descriptions. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior and asymptotes. *Clarification 2*: Within the Algebra 1 course, functions other than linear, quadratic or exponential must be represented graphically. *Clarification 3*: Within the Algebra 1 course, instruction includes verifying that a quantity increasing exponentially eventually exceeds a quantity increasing linearly or quadratically.
MA.912.F.1.8:	Determine whether a linear, quadratic or exponential function best models a given real-world situation. **Clarifications:** *Clarification 1*: Instruction includes recognizing that linear functions model situations in which a quantity changes by a constant amount per unit interval; that quadratic functions model situations in which a quantity increases to a maximum, then begins to decrease or a quantity decreases to a minimum, then begins to increase; and that exponential functions model situations in which a quantity grows or decays by a constant percent per unit interval. *Clarification 2*: Within this benchmark, the expectation is to identify the type of function from a written description or table.
MA.912.F.2.1:	Identify the effect on the graph or table of a given function after replacing $f(x)$ by $f(x)+k$,$kf(x)$, $f(kx)$ and $f(x+k)$ for specific values of k. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, functions are limited to linear, quadratic and absolute value. *Clarification 2*: Instruction focuses on including positive and negative values for k.
MA.912.FL.3.2:	Solve real-world problems involving simple, compound and continuously compounded interest. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, interest is limited to simple and compound.
MA.912.FL.3.4:	Explain the relationship between simple interest and linear growth. Explain the relationship between compound interest and exponential growth and the relationship between continuously compounded interest and exponential growth. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, exponential growth is limited to compound interest.
MA.912.NSO.1.1:	Extend previous understanding of the Laws of Exponents to include rational exponents. Apply the Laws of Exponents to evaluate numerical expressions and generate equivalent numerical expressions involving rational exponents. **Clarifications:** *Clarification 1:* Instruction includes the use of technology when appropriate. *Clarification 2:* Refer to the K-12 Formulas (Appendix E) for the Laws of Exponents. *Clarification 3:* Instruction includes converting between expressions involving rational exponents and expressions involving radicals. *Clarification 4:*Within the Mathematics for Data and Financial Literacy course, it is not the expectation to generate equivalent numerical expressions.
MA.912.NSO.1.2:	Generate equivalent algebraic expressions using the properties of exponents.
MA.912.NSO.1.4:	Apply previous understanding of operations with rational numbers to add, subtract, multiply and divide numerical radicals. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, expressions are limited to a single arithmetic operation involving two square roots or two cube roots.
MA.K12.MTR.1.1:	Mathematicians who participate in effortful learning both individually and with others: • Analyze the problem in a way that makes sense given the task. • Ask questions that will help with solving the task. • Build perseverance by modifying methods as needed while solving a challenging task. • Stay engaged and maintain a positive mindset when working to solve tasks. • Help and support each other when attempting a new method or approach. **Clarifications:** Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: • Build understanding through modeling and using manipulatives. • Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. • Progress from modeling problems with objects and drawings to using algorithms and equations. • Express connections between concepts and representations. • Choose a representation based on the given context or purpose. **Clarifications:**

	Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations. **Clarifications:** Teachers who encourage students to complete tasks with mathematical fluency: • Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. • Offer multiple opportunities for students to practice efficient and generalizable methods. • Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: • Communicate mathematical ideas, vocabulary and methods effectively. • Analyze the mathematical thinking of others. • Compare the efficiency of a method to those expressed by others. • Recognize errors and suggest how to correctly solve the task. • Justify results by explaining methods and processes. • Construct possible arguments based on evidence. **Clarifications:** Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. **Clarifications:** Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. **Clarifications:** Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems. • Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. **Clarifications:**

	Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. **Clarifications:** K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. **Clarifications:** See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. **Clarifications:** Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. **Clarifications:** In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think _______ because ______." The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. **Clarifications:** Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. **Clarifications:** In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

General Course Information and Notes

VERSION DESCRIPTION

In Algebra 1, instructional time will emphasize five areas: (1) performing operations with polynomials and radicals, and extending the Laws of Exponents to include rational exponents; (2) extending understanding of functions to linear, quadratic and exponential functions and using them to model and analyze real-world relationships; (3) solving quadratic equations in one variable and systems of linear equations and inequalities in two variables; (4) building functions, identifying their key features and representing them in various ways and (5) representing and interpreting categorical and numerical data with one and two variables.

All clarifications stated, whether general or specific to Algebra I, are expectations for instruction of that benchmark.

Curricular content for all subjects must integrate critical-thinking, problem-solving, and workforce-literacy skills; communication, reading, and writing skills; mathematics skills; collaboration skills; contextual and applied-learning skills; technology-literacy skills; information and media-literacy skills; and civic-engagement skills.

GENERAL NOTES

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards
This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Number: 1200310

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Algebra >

Abbreviated Title: ALG 1

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- Class Size Core Required

Course Type: Core Academic Course

Course Level: 2

Course Status: State Board Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Algebra 1

Educator Certifications

Middle Grades Mathematics (Middle Grades 5-9)
Mathematics (Grades 6-12)

Equivalent Courses

1200310-Algebra 1 Equivalency start year: 2018
1200320-Algebra 1 Honors Equivalency start year: 2014
1209810-Cambridge Pre-AICE Mathematics 1 IGCSE Level Equivalency start year: 2014
1200390-International Baccalaureate Mid Yrs Prog Algebra 1 Equivalency start year: 2014

Algebra 1 for Credit Recovery (#1200315) 2015 - 2022 (current)

Course Standards

Name	Description
MAFS.912.A-APR.1.1:	Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. **Clarifications:** **Algebra 1 - Fluency Recommendations** Fluency in adding, subtracting, and multiplying polynomials supports students throughout their work in algebra, as well as in their symbolic work with functions. Manipulation can be more mindful when it is fluent.
MAFS.912.A-APR.2.3:	Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.
MAFS.912.A-CED.1.1:	Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational, absolute, and exponential functions. ★
MAFS.912.A-CED.1.2:	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. ★
MAFS.912.A-CED.1.3:	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.* ★
MAFS.912.A-CED.1.4:	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law $V = IR$ to highlight resistance R.* ★
MAFS.912.A-REI.1.1:	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
MAFS.912.A-REI.2.3:	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
MAFS.912.A-REI.2.4:	Solve quadratic equations in one variable. a. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x – p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form. b. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.
MAFS.912.A-REI.3.5:	Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.
MAFS.912.A-REI.3.6:	Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
MAFS.912.A-REI.4.10:	Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).
MAFS.912.A-REI.4.11:	Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. ★
MAFS.912.A-REI.4.12:	Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.
MAFS.912.A-SSE.1.1:	Interpret expressions that represent a quantity in terms of its context. ★ a. Interpret parts of an expression, such as terms, factors, and coefficients. b. Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret □ as the product of P and a factor not depending on P.*
MAFS.912.A-SSE.1.2:	Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 - y^4$ as $(x^2)^2 – (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 – y^2)(x^2 + y^2)$.*
MAFS.912.A-SSE.2.3:	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.★ a. Factor a quadratic expression to reveal the zeros of the function it defines. b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. c. Use the properties of exponents to transform expressions for exponential functions. *For example the expression* 1.15^t *can be rewritten as* $(1.15^{1/12})^{12t} \approx 1.012^{12t}$ *to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.*
MAFS.912.F-BF.1.1:	Write a function that describes a relationship between two quantities. ★ a. Determine an explicit expression, a recursive process, or steps for calculation from a context. b. Combine standard function types using arithmetic operations. *For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.* c. Compose functions. *For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time.*

MAFS.912.F-BF.2.3:	Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. *Include recognizing even and odd functions from their graphs and algebraic expressions for them.*
MAFS.912.F-IF.1.1:	Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input x. The graph of f is the graph of the equation y = f(x).
MAFS.912.F-IF.1.2:	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
MAFS.912.F-IF.1.3:	Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by f(0) = f(1) = 1, f(n+1) = f(n) + f(n-1) for n ≥ 1.
MAFS.912.F-IF.2.4:	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.* ★
MAFS.912.F-IF.2.5:	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble engines in a factory, then the positive integers would be an appropriate domain for the function.* ★
MAFS.912.F-IF.2.6:	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. ★
MAFS.912.F-IF.3.8:	Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. b. Use the properties of exponents to interpret expressions for exponential functions. *For example, identify percent rate of change in functions such as y =* $(1.02)^t$*, y =* $(0.97)^t$*, y =* $(1.01)^{12t}$*, y =* $(1.2)^{t/10}$*, and classify them as representing exponential growth or decay.*
MAFS.912.F-IF.3.9:	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.*
MAFS.912.F-LE.1.1:	Distinguish between situations that can be modeled with linear functions and with exponential functions. ★ a. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
MAFS.912.F-LE.1.2:	Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table). ★
MAFS.912.F-LE.1.3:	Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function. ★
MAFS.912.F-LE.2.5:	Interpret the parameters in a linear or exponential function in terms of a context. ★
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★
MAFS.912.N-Q.1.2:	Define appropriate quantities for the purpose of descriptive modeling. ★ **Clarifications:** **Algebra 1 Content Notes:** Working with quantities and the relationships between them provides grounding for work with expressions, equations, and functions.
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★
MAFS.912.N-RN.1.1:	Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. *For example, we define* $5^{1/3}$ *to be the cube root of 5 because we want* $(5^{1/3})^3 = 5^{(1/3)3}$ *to hold, so* $(5^{1/3})^3$ *must equal 5.*
MAFS.912.N-RN.1.2:	Rewrite expressions involving radicals and rational exponents using the properties of exponents.
MAFS.912.N-RN.2.3:	Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.
MAFS.912.S-ID.1.1:	Represent data with plots on the real number line (dot plots, histograms, and box plots). ★ **Clarifications:** In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.2:	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. ★ **Clarifications:** In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.3:	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). ★ **Clarifications:** In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.2.5:	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. ★
	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. ★ a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. *Use given functions or choose a function suggested by the context. Emphasize linear, and exponential models.*

MAFS.912.S-ID.2.6:	b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association. **Clarifications:** Students take a more sophisticated look at using a linear function to model the relationship between two numerical variables. In addition to fitting a line to data, students assess how well the model fits by analyzing residuals.
MAFS.912.S-ID.3.7:	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. ★
MAFS.912.S-ID.3.8:	Compute (using technology) and interpret the correlation coefficient of a linear fit. ★
MAFS.912.S-ID.3.9:	Distinguish between correlation and causation. ★
MAFS.K12.MP.1.1:	**Make sense of problems and persevere in solving them.** Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
MAFS.K12.MP.2.1:	**Reason abstractly and quantitatively**. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
MAFS.K12.MP.3.1:	**Construct viable arguments and critique the reasoning of others.** Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
MAFS.K12.MP.4.1:	**Model with mathematics.** Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
MAFS.K12.MP.5.1:	**Use appropriate tools strategically.** Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
MAFS.K12.MP.6.1:	**Attend to precision.** Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
	Look for and make use of structure. Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven

MAFS.K12.MP.7.1:	more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
MAFS.K12.MP.8.1:	**Look for and express regularity in repeated reasoning.** Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
LAFS.910.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
LAFS.910.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.
LAFS.910.RST.3.7:	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LAFS.910.SL.1.1:	Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed. c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions. d. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.
LAFS.910.SL.1.2:	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
LAFS.910.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.
LAFS.910.SL.2.4:	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
LAFS.910.WHST.1.1:	Write arguments focused on *discipline-specific content.* a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns. c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.910.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.910.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

VERSION DESCRIPTION

Credit Recovery courses are credit bearing courses with specific content requirements defined by Next Generation Sunshine State Standards and/or Florida Standards. Students enrolled in a Credit Recovery course must have previously attempted the corresponding course (and/or End-of-Course assessment) since the course requirements for the Credit Recovery course is exactly the same as the previously attempted corresponding course. For example, Geometry (1206310) and Geometry for Credit Recovery (1206315) have identical content requirements. It is important to note that Credit Recovery courses are not bound by Section 1003.436(1) (a), Florida Statutes, requiring a minimum of 135 hours of bona fide instruction (120 hours in a school/district implementing block scheduling) in a designed course of study that contains student performance standards, since the students have previously attempted successful completion of the corresponding course. Additionally, Credit Recovery courses should ONLY be used for credit recovery, grade forgiveness, or remediation for students needing to prepare for an End-of-Course assessment retake.

GENERAL NOTES

The fundamental purpose of this course is to formalize and extend the mathematics that students learned in the middle grades. The critical areas, called units, deepen and extend understanding of linear and exponential relationships by contrasting them with each other and by applying linear models to data that exhibit a linear trend, and students engage in methods for analyzing, solving, and using quadratic functions. The Standards for Mathematical Practice apply throughout each course and, together with the content standards, prescribe that students experience mathematics as a coherent, useful, and logical subject that makes use of their ability to make sense of problem situations.

Unit 1- Relationships Between Quantities and Reasoning with Equations: By the end of eighth grade, students have learned to solve linear equations in one variable and have applied graphical and algebraic methods to analyze and solve systems of linear equations in two variables. Now, students analyze and explain the process of solving an equation. Students develop fluency writing, interpreting, and translating between various forms of linear equations and inequalities, and using them to solve problems. They master the solution of linear equations and apply related solution techniques and the laws of exponents to the creation and solution of simple exponential equations.

Unit 2- Linear and Exponential Relationships: In earlier grades, students define, evaluate, and compare functions, and use them to model relationships between quantities. In this unit, students will learn function notation and develop the concepts of domain and range. They explore many examples of functions, including sequences; they interpret functions given graphically, numerically, symbolically, and verbally, translate between representations, and understand the limitations of various representations. Students build on and informally extend their understanding of integer exponents to consider exponential functions. They compare and contrast linear and exponential functions, distinguishing between additive and multiplicative change. Students explore systems of equations and inequalities, and they find and interpret their solutions. They interpret arithmetic sequences as linear functions and geometric sequences as exponential functions.

Unit 3- Descriptive Statistics: This unit builds upon students prior experiences with data, providing students with more formal means of assessing how a model fits data. Students use regression techniques to describe and approximate linear relationships between quantities. They use graphical representations and knowledge of the context to make judgments about the appropriateness of linear models. With linear models, they look at residuals to analyze the goodness of fit.

Unit 4- Expressions and Equations: In this unit, students build on their knowledge from unit 2, where they extended the laws of exponents to rational exponents. Students apply this new understanding of number and strengthen their ability to see structure in and create quadratic and exponential expressions. They create and solve equations, inequalities, and systems of equations involving quadratic expressions.

Unit 5- Quadratic Functions and Modeling: In this unit, students consider quadratic functions, comparing the key characteristics of quadratic functions to those of linear and exponential functions. They select from among these functions to model phenomena. Students learn to anticipate the graph of a quadratic function by interpreting various forms of quadratic expressions. In particular, they identify the real solutions of a quadratic equation as the zeros of a related quadratic function. Students expand their experience with functions to include more specialized functions absolute value, step, and those that are piece wise-defined.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:
https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Number: 1200315

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Algebra >

Abbreviated Title: ALG 1 CR

Number of Credits: One (1) credit

Course Length: Credit Recovery (R)

Course Type: Elective Course

Course Level: 2

Course Status: Course Approved

Grade Level(s): 9,10,11,12

Educator Certifications

Mathematics (Grades 6-12)
Middle Grades Mathematics (Middle Grades 5-9)

Algebra 1 for Credit Recovery (#1200315) 2022 - And Beyond

Course Standards

Name	Description
MA.912.AR.1.1:	Identify and interpret parts of an equation or expression that represent a quantity in terms of a mathematical or real-world context, including viewing one or more of its parts as a single entity. **Clarifications:** *Clarification 1:* Parts of an expression include factors, terms, constants, coefficients and variables. *Clarification 2:* Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.1.2:	Rearrange equations or formulas to isolate a quantity of interest. **Clarifications:** *Clarification 1*: Instruction includes using formulas for temperature, perimeter, area and volume; using equations for linear (standard, slope-intercept and point-slope forms) and quadratic (standard, factored and vertex forms) functions. *Clarification 2*: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.1.3:	Add, subtract and multiply polynomial expressions with rational number coefficients. **Clarifications:** *Clarification 1: I*nstruction includes an understanding that when any of these operations are performed with polynomials the result is also a polynomial. *Clarification 2:* Within the Algebra 1 course, polynomial expressions are limited to 3 or fewer terms.
MA.912.AR.1.4:	Divide a polynomial expression by a monomial expression with rational number coefficients. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, polynomial expressions are limited to 3 or fewer terms.
MA.912.AR.1.7:	Rewrite a polynomial expression as a product of polynomials over the real number system. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, polynomial expressions are limited to 4 or fewer terms with integer coefficients.
MA.912.AR.2.1:	Given a real-world context, write and solve one-variable multi-step linear equations.
MA.912.AR.2.2:	Write a linear two-variable equation to represent the relationship between two quantities from a graph, a written description or a table of values within a mathematical or real-world context. **Clarifications:** *Clarification 1:* Instruction includes the use of standard form, slope-intercept form and point-slope form, and the conversion between these forms.
MA.912.AR.2.3:	Write a linear two-variable equation for a line that is parallel or perpendicular to a given line and goes through a given point. **Clarifications:** *Clarification 1:* Instruction focuses on recognizing that perpendicular lines have slopes that when multiplied result in -1 and that parallel lines have slopes that are the same. *Clarification 2:* Instruction includes representing a line with a pair of points on the coordinate plane or with an equation. *Clarification 3:* Problems include cases where one variable has a coefficient of zero.
MA.912.AR.2.4:	Given a table, equation or written description of a linear function, graph that function, and determine and interpret its key features. **Clarifications:** *Clarification 1*: Key features are limited to domain, range, intercepts and rate of change. *Clarification 2*: Instruction includes the use of standard form, slope-intercept form and point-slope form. *Clarification 3*: Instruction includes cases where one variable has a coefficient of zero. *Clarification 4*: Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation. *Clarification 5*: Within the Algebra 1 course, notations for domain and range are limited to inequality and set-builder notations.
MA.912.AR.2.5:	Solve and graph mathematical and real-world problems that are modeled with linear functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain, range, intercepts and rate of change. *Clarification 2*: Instruction includes the use of standard form, slope-intercept form and point-slope form. *Clarification 3*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation. *Clarification 4*: Within the Algebra 1 course, notations for domain, range and constraints are limited to inequality and set-builder. *Clarification 5*: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.2.6:	Given a mathematical or real-world context, write and solve one-variable linear inequalities, including compound inequalities. Represent solutions algebraically or graphically.

MA.912.AR.2.7:	Write two-variable linear inequalities to represent relationships between quantities from a graph or a written description within a mathematical or real-world context. **Clarifications:** *Clarification 1:* Instruction includes the use of standard form, slope-intercept form and point-slope form and any inequality symbol can be represented. *Clarification 2:* Instruction includes cases where one variable has a coefficient of zero.
MA.912.AR.2.8:	Given a mathematical or real-world context, graph the solution set to a two-variable linear inequality. **Clarifications:** *Clarification 1:* Instruction includes the use of standard form, slope-intercept form and point-slope form and any inequality symbol can be represented. *Clarification 2:* Instruction includes cases where one variable has a coefficient of zero.
MA.912.AR.3.1:	Given a mathematical or real-world context, write and solve one-variable quadratic equations over the real number system. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, instruction includes the concept of non-real answers, without determining non-real solutions. *Clarification 2:* Within this benchmark, the expectation is to solve by factoring techniques, taking square roots, the quadratic formula and completing the square.
MA.912.AR.3.4:	Write a quadratic function to represent the relationship between two quantities from a graph, a written description or a table of values within a mathematical or real-world context. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, a graph, written description or table of values must include the vertex and two points that are equidistant from the vertex. *Clarification 2*: Instruction includes the use of standard form, factored form and vertex form. *Clarification 3*: Within the Algebra 2 course, one of the given points must be the vertex or an *x*-intercept.
MA.912.AR.3.5:	Given the x-intercepts and another point on the graph of a quadratic function, write the equation for the function.
MA.912.AR.3.6:	Given an expression or equation representing a quadratic function, determine the vertex and zeros and interpret them in terms of a real-world context.
MA.912.AR.3.7:	Given a table, equation or written description of a quadratic function, graph that function, and determine and interpret its key features. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior; vertex; and symmetry. *Clarification 2*: Instruction includes the use of standard form, factored form and vertex form, and sketching a graph using the zeros and vertex. *Clarification 3*: Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation. *Clarification 4*: Within the Algebra 1 course, notations for domain and range are limited to inequality and set-builder.
MA.912.AR.3.8:	Solve and graph mathematical and real-world problems that are modeled with quadratic functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior; vertex; and symmetry. *Clarification 2*: Instruction includes the use of standard form, factored form and vertex form. *Clarification 3*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation. *Clarification 4*: Within the Algebra 1 course, notations for domain, range and constraints are limited to inequality and set-builder.
MA.912.AR.4.1:	Given a mathematical or real-world context, write and solve one-variable absolute value equations.
MA.912.AR.4.3:	Given a table, equation or written description of an absolute value function, graph that function and determine its key features. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; vertex; end behavior and symmetry. *Clarification 2*: Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation. *Clarification 3*: Within the Algebra 1 course, notations for domain and range are limited to inequality and set-builder.
MA.912.AR.5.3:	Given a mathematical or real-world context, classify an exponential function as representing growth or decay. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, exponential functions are limited to the forms $f(x) = ab^x$, where *b* is a whole number greater than 1 or a unit fraction, or $f(x) = a(1 \pm r)^x$, where $0 < r < 1$.
MA.912.AR.5.4:	Write an exponential function to represent a relationship between two quantities from a graph, a written description or a table of values within a mathematical or real-world context. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, exponential functions are limited to the forms $f(x) = ab^x$, where *b* is a whole number greater than 1 or a unit fraction, or $f(x) = a(1 \pm r)^x$, where $0 < r < 1$. *Clarification 2:* Within the Algebra 1 course, tables are limited to having successive nonnegative integer inputs so that the function may be determined by finding ratios between successive outputs.
	Given a table, equation or written description of an exponential function, graph that function and determine its key features.

MA.912.AR.5.6:	**Clarifications:** *Clarification 1:* Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; constant percent rate of change; end behavior and asymptotes. *Clarification 2:* Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation. *Clarification 3:* Within the Algebra 1 course, notations for domain and range are limited to inequality and set-builder. *Clarification 4:* Within the Algebra 1 course, exponential functions are limited to the forms $f(x) = ab^x$, where *b* is a whole number greater than 1 or a unit fraction or $f(x) = a(1 \pm r)^x$, where $0 < r < 1$.
MA.912.AR.9.1:	Given a mathematical or real-world context, write and solve a system of two-variable linear equations algebraically or graphically. **Clarifications:** *Clarification 1*: Within this benchmark, the expectation is to solve systems using elimination, substitution and graphing. *Clarification 2*: Within the Algebra 1 course, the system is limited to two equations.
MA.912.AR.9.4:	Graph the solution set of a system of two-variable linear inequalities. **Clarifications:** *Clarification 1:* Instruction includes cases where one variable has a coefficient of zero. *Clarification 2:* Within the Algebra 1 course, the system is limited to two inequalities.
MA.912.AR.9.6:	Given a real-world context, represent constraints as systems of linear equations or inequalities. Interpret solutions to problems as viable or non-viable options. **Clarifications:** *Clarification 1*: Instruction focuses on analyzing a given function that models a real-world situation and writing constraints that are represented as linear equations or linear inequalities.
MA.912.DP.1.1:	Given a set of data, select an appropriate method to represent the data, depending on whether it is numerical or categorical data and on whether it is univariate or bivariate. **Clarifications:** *Clarification 1:* Instruction includes discussions regarding the strengths and weaknesses of each data display. *Clarification 2:* Numerical univariate includes histograms, stem-and-leaf plots, box plots and line plots; numerical bivariate includes scatter plots and line graphs; categorical univariate includes bar charts, circle graphs, line plots, frequency tables and relative frequency tables; and categorical bivariate includes segmented bar charts, joint frequency tables and joint relative frequency tables. *Clarification 3:* Instruction includes the use of appropriate units and labels and, where appropriate, using technology to create data displays.
MA.912.DP.1.2:	Interpret data distributions represented in various ways. State whether the data is numerical or categorical, whether it is univariate or bivariate and interpret the different components and quantities in the display. **Clarifications:** *Clarification 1*: Within the Probability and Statistics course, instruction includes the use of spreadsheets and technology.
MA.912.DP.1.3:	Explain the difference between correlation and causation in the contexts of both numerical and categorical data.
MA.912.DP.1.4:	Estimate a population total, mean or percentage using data from a sample survey; develop a margin of error through the use of simulation. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, the margin of error will be given.
MA.912.DP.2.4:	Fit a linear function to bivariate numerical data that suggests a linear association and interpret the slope and y-intercept of the model. Use the model to solve real-world problems in terms of the context of the data. **Clarifications:** *Clarification 1*: Instruction includes fitting a linear function both informally and formally with the use of technology. *Clarification 2*: Problems include making a prediction or extrapolation, inside and outside the range of the data, based on the equation of the line of fit.
MA.912.DP.2.6:	Given a scatter plot with a line of fit and residuals, determine the strength and direction of the correlation. Interpret strength and direction within a real-world context. **Clarifications:** *Clarification 1*: Instruction focuses on determining the direction by analyzing the slope and informally determining the strength by analyzing the residuals.
MA.912.DP.3.1:	Construct a two-way frequency table summarizing bivariate categorical data. Interpret joint and marginal frequencies and determine possible associations in terms of a real-world context.
MA.912.F.1.1:	Given an equation or graph that defines a function, determine the function type. Given an input-output table, determine a function type that could represent it. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, functions represented as tables are limited to linear, quadratic and exponential. *Clarification 2:* Within the Algebra 1 course, functions represented as equations or graphs are limited to vertical or horizontal translations or reflections over the x-axis of the following parent functions: $f(x) = x$, $f(x) = x^2$, $f(x) = x^3$, $f(x) = \sqrt{x}$, $f(x) = \sqrt[3]{x}$, $f(x) = \lvert x \rvert$, $f(x) = 2^x$ and $f(x) = \left(\frac{1}{2}\right)^x$.
MA.912.F.1.2:	Given a function represented in function notation, evaluate the function for an input in its domain. For a real-world context, interpret the output. **Clarifications:** *Clarification 1*: Problems include simple functions in two-variables, such as f(x,y)=3x-2y. *Clarification 2*: Within the Algebra 1 course, functions are limited to one-variable such as f(x)=3x.
	Calculate and interpret the average rate of change of a real-world situation represented graphically, algebraically or in a table over a specified

MA.912.F.1.3:	interval. **Clarifications:** *Clarification 1*: Instruction includes making the connection to determining the slope of a particular line segment.
MA.912.F.1.5:	Compare key features of linear functions each represented algebraically, graphically, in tables or written descriptions. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; slope and end behavior.
MA.912.F.1.6:	Compare key features of linear and nonlinear functions each represented algebraically, graphically, in tables or written descriptions. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior and asymptotes. *Clarification 2*: Within the Algebra 1 course, functions other than linear, quadratic or exponential must be represented graphically. *Clarification 3*: Within the Algebra 1 course, instruction includes verifying that a quantity increasing exponentially eventually exceeds a quantity increasing linearly or quadratically.
MA.912.F.1.8:	Determine whether a linear, quadratic or exponential function best models a given real-world situation. **Clarifications:** *Clarification 1*: Instruction includes recognizing that linear functions model situations in which a quantity changes by a constant amount per unit interval; that quadratic functions model situations in which a quantity increases to a maximum, then begins to decrease or a quantity decreases to a minimum, then begins to increase; and that exponential functions model situations in which a quantity grows or decays by a constant percent per unit interval. *Clarification 2*: Within this benchmark, the expectation is to identify the type of function from a written description or table.
MA.912.F.2.1:	Identify the effect on the graph or table of a given function after replacing $f(x)$ by $f(x)+k$,$kf(x)$, $f(kx)$ and $f(x+k)$ for specific values of k. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, functions are limited to linear, quadratic and absolute value. *Clarification 2*: Instruction focuses on including positive and negative values for k.
MA.912.FL.3.2:	Solve real-world problems involving simple, compound and continuously compounded interest. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, interest is limited to simple and compound.
MA.912.FL.3.4:	Explain the relationship between simple interest and linear growth. Explain the relationship between compound interest and exponential growth and the relationship between continuously compounded interest and exponential growth. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, exponential growth is limited to compound interest.
MA.912.NSO.1.1:	Extend previous understanding of the Laws of Exponents to include rational exponents. Apply the Laws of Exponents to evaluate numerical expressions and generate equivalent numerical expressions involving rational exponents. **Clarifications:** *Clarification 1:* Instruction includes the use of technology when appropriate. *Clarification 2:* Refer to the K-12 Formulas (Appendix E) for the Laws of Exponents. *Clarification 3:* Instruction includes converting between expressions involving rational exponents and expressions involving radicals. *Clarification 4:*Within the Mathematics for Data and Financial Literacy course, it is not the expectation to generate equivalent numerical expressions.
MA.912.NSO.1.2:	Generate equivalent algebraic expressions using the properties of exponents.
MA.912.NSO.1.4:	Apply previous understanding of operations with rational numbers to add, subtract, multiply and divide numerical radicals. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, expressions are limited to a single arithmetic operation involving two square roots or two cube roots.
MA.K12.MTR.1.1:	Mathematicians who participate in effortful learning both individually and with others: • Analyze the problem in a way that makes sense given the task. • Ask questions that will help with solving the task. • Build perseverance by modifying methods as needed while solving a challenging task. • Stay engaged and maintain a positive mindset when working to solve tasks. • Help and support each other when attempting a new method or approach. **Clarifications:** Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: • Build understanding through modeling and using manipulatives. • Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. • Progress from modeling problems with objects and drawings to using algorithms and equations. • Express connections between concepts and representations. • Choose a representation based on the given context or purpose. **Clarifications:**

	Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations. **Clarifications:** Teachers who encourage students to complete tasks with mathematical fluency: • Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. • Offer multiple opportunities for students to practice efficient and generalizable methods. • Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: • Communicate mathematical ideas, vocabulary and methods effectively. • Analyze the mathematical thinking of others. • Compare the efficiency of a method to those expressed by others. • Recognize errors and suggest how to correctly solve the task. • Justify results by explaining methods and processes. • Construct possible arguments based on evidence. **Clarifications:** Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. **Clarifications:** Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. **Clarifications:** Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems. • Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. **Clarifications:**

	Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. **Clarifications:** K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. **Clarifications:** See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. **Clarifications:** Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. **Clarifications:** In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think _______ because ______." The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. **Clarifications:** Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. **Clarifications:** In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

General Course Information and Notes

VERSION DESCRIPTION

Credit Recovery courses are credit bearing courses with specific content requirements defined by Next Generation Sunshine State Standards. Students enrolled in a Credit Recovery course must have previously attempted the corresponding course (and/or End-of-Course assessment) since the course requirements for the Credit Recovery course is exactly the same as the previously attempted corresponding course. For example, Geometry (1206310) and Geometry for Credit Recovery (1206315) have identical content requirements. It is important to note that Credit Recovery courses are not bound by Section 1003.436(1) (a), Florida Statutes, requiring a minimum of 135 hours of bona fide instruction (120 hours in a school/district implementing block scheduling) in a designed course of study that contains student performance standards, since the students have previously attempted successful completion of the corresponding course. Additionally, Credit Recovery courses should ONLY be used for credit recovery, grade forgiveness, or remediation for students needing to prepare for an End-of-Course assessment retake.

In Algebra 1, instructional time will emphasize five areas: (1) performing operations with polynomials and radicals, and extending the Laws of Exponents to include rational exponents; (2) extending understanding of functions to linear, quadratic and exponential functions and using them to model and analyze real-world relationships; (3) solving quadratic equations in one variable and systems of linear equations and inequalities in two variables; (4) building functions, identifying their key features and representing them in various ways and (5) representing and interpreting categorical and numerical data with one and two variables.

All clarifications stated, whether general or specific to Algebra I, are expectations for instruction of that benchmark.

Curricular content for all subjects must integrate critical-thinking, problem-solving, and workforce-literacy skills; communication, reading, and writing skills; mathematics skills; collaboration skills; contextual and applied-learning skills; technology-literacy skills; information and media-literacy skills; and civic-engagement skills.

GENERAL NOTES

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards
This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Number: 1200315

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Algebra >

Abbreviated Title: ALG 1 CR

Number of Credits: One (1) credit

Course Length: Credit Recovery (R)

Course Attributes:

- Class Size Core Required

Course Type: Elective Course

Course Level: 2

Course Status: State Board Approved

Grade Level(s): 9,10,11,12

Educator Certifications

Mathematics (Grades 6-12)
Middle Grades Mathematics (Middle Grades 5-9)

Algebra 1 Honors (#1200320) 2015 - 2022 (current)

Course Standards

Name	Description
MAFS.912.A-APR.1.1:	Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. **Clarifications:** **Algebra 1 - Fluency Recommendations** Fluency in adding, subtracting, and multiplying polynomials supports students throughout their work in algebra, as well as in their symbolic work with functions. Manipulation can be more mindful when it is fluent.
MAFS.912.A-APR.2.2:	Know and apply the Remainder Theorem: For a polynomial p(x) and a number a, the remainder on division by x – a is p(a), so p(a) = 0 if and only if (x – a) is a factor of p(x).
MAFS.912.A-APR.2.3:	Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.
MAFS.912.A-APR.3.4:	Prove polynomial identities and use them to describe numerical relationships. For example, the polynomial identity $(x^2 + y^2)^2 = (x^2 - y^2)^2 + (2xy)^2$ can be used to generate Pythagorean triples.
MAFS.912.A-APR.4.6:	Rewrite simple rational expressions in different forms; write a(x)/b(x) in the form q(x) + r(x)/b(x), where a(x), b(x), q(x), and r(x) are polynomials with the degree of r(x) less than the degree of b(x), using inspection, long division, or, for the more complicated examples, a computer algebra system.
MAFS.912.A-CED.1.1:	Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational, absolute, and exponential functions. ★
MAFS.912.A-CED.1.2:	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. ★
MAFS.912.A-CED.1.3:	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.* ★
MAFS.912.A-CED.1.4:	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law V = IR to highlight resistance R.* ★
MAFS.912.A-REI.1.1:	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
MAFS.912.A-REI.1.2:	Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.
MAFS.912.A-REI.2.3:	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
MAFS.912.A-REI.2.4:	Solve quadratic equations in one variable. a. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form. b. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.
MAFS.912.A-REI.3.5:	Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.
MAFS.912.A-REI.3.6:	Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
MAFS.912.A-REI.3.7:	Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. *For example, find the points of intersection between the line $y = -3x$ and the circle $x^2 + y^2 = 3$.*
MAFS.912.A-REI.4.10:	Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).
MAFS.912.A-REI.4.11:	Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. ★
MAFS.912.A-REI.4.12:	Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.
MAFS.912.A-SSE.1.1:	Interpret expressions that represent a quantity in terms of its context. ★ a. Interpret parts of an expression, such as terms, factors, and coefficients. b. Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret as the product of P and a factor not depending on P.*
MAFS.912.A-SSE.1.2:	Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.*
MAFS.912.A-SSE.2.3:	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.★ a. Factor a quadratic expression to reveal the zeros of the function it defines. b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.

	c. Use the properties of exponents to transform expressions for exponential functions. *For example the expression* 1.15^t *can be rewritten as* $(1.15^{1/12})^{12t} \approx 1.012^{12t}$ *to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.*
MAFS.912.A-SSE.2.4:	Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. *For example, calculate mortgage payments.* ★
MAFS.912.F-BF.1.1:	Write a function that describes a relationship between two quantities. ★ a. Determine an explicit expression, a recursive process, or steps for calculation from a context. b. Combine standard function types using arithmetic operations. *For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.* c. Compose functions. *For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time.*
MAFS.912.F-BF.1.2:	Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms. ★
MAFS.912.F-BF.2.3:	Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. *Include recognizing even and odd functions from their graphs and algebraic expressions for them.*
MAFS.912.F-BF.2.4:	Find inverse functions. a. Solve an equation of the form f(x) = c for a simple function f that has an inverse and write an expression for the inverse. *For example,* $f(x) = 2x^3$ *or* $f(x) = (x+1)/(x-1)$ *for* $x \neq 1$. b. Verify by composition that one function is the inverse of another. c. Read values of an inverse function from a graph or a table, given that the function has an inverse. d. Produce an invertible function from a non-invertible function by restricting the domain.
MAFS.912.F-IF.1.1:	Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input x. The graph of f is the graph of the equation y = f(x).
MAFS.912.F-IF.1.2:	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
MAFS.912.F-IF.1.3:	Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by f(0) = f(1) = 1, f(n+1) = f(n) + f(n-1) for n ≥ 1.
MAFS.912.F-IF.2.4:	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.* ★
MAFS.912.F-IF.2.5:	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble engines in a factory, then the positive integers would be an appropriate domain for the function.* ★
MAFS.912.F-IF.2.6:	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. ★
MAFS.912.F-IF.3.7:	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★ a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift.
MAFS.912.F-IF.3.8:	Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. b. Use the properties of exponents to interpret expressions for exponential functions. *For example, identify percent rate of change in functions such as* $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)^{12t}$, $y = (1.2)^{t/10}$, *and classify them as representing exponential growth or decay.*
MAFS.912.F-IF.3.9:	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.*
MAFS.912.F-LE.1.1:	Distinguish between situations that can be modeled with linear functions and with exponential functions. ★ a. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
MAFS.912.F-LE.1.2:	Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table). ★
MAFS.912.F-LE.1.3:	Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function. ★
MAFS.912.F-LE.2.5:	Interpret the parameters in a linear or exponential function in terms of a context. ★
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★
MAFS.912.N-Q.1.2:	Define appropriate quantities for the purpose of descriptive modeling. ★ **Clarifications:** **Algebra 1 Content Notes:**

	Working with quantities and the relationships between them provides grounding for work with expressions, equations, and functions.
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★
MAFS.912.N-RN.1.1:	Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. *For example, we define* $5^{1/3}$ *to be the cube root of 5 because we want* $(5^{1/3})^3 = 5^{(1/3)3}$ *to hold, so* $(5^{1/3})^3$ *must equal 5.*
MAFS.912.N-RN.1.2:	Rewrite expressions involving radicals and rational exponents using the properties of exponents.
MAFS.912.N-RN.2.3:	Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.
MAFS.912.S-ID.1.1:	Represent data with plots on the real number line (dot plots, histograms, and box plots). ★ **Clarifications:** In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.2:	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. ★ **Clarifications:** In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.3:	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). ★ **Clarifications:** In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.4:	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. ★
MAFS.912.S-ID.2.5:	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. ★
MAFS.912.S-ID.2.6:	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. ★ a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. *Use given functions or choose a function suggested by the context. Emphasize linear, and exponential models.* b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association. **Clarifications:** Students take a more sophisticated look at using a linear function to model the relationship between two numerical variables. In addition to fitting a line to data, students assess how well the model fits by analyzing residuals.
MAFS.912.S-ID.3.7:	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. ★
MAFS.912.S-ID.3.8:	Compute (using technology) and interpret the correlation coefficient of a linear fit. ★
MAFS.912.S-ID.3.9:	Distinguish between correlation and causation. ★
MAFS.K12.MP.1.1:	**Make sense of problems and persevere in solving them.** Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
MAFS.K12.MP.2.1:	**Reason abstractly and quantitatively**. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
MAFS.K12.MP.3.1:	**Construct viable arguments and critique the reasoning of others.** Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.

MAFS.K12.MP.4.1:	**Model with mathematics.** Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
MAFS.K12.MP.5.1:	**Use appropriate tools strategically.** Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
MAFS.K12.MP.6.1:	**Attend to precision.** Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
MAFS.K12.MP.7.1:	**Look for and make use of structure.** Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 – 3(x – y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
MAFS.K12.MP.8.1:	**Look for and express regularity in repeated reasoning.** Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y – 2)/(x – 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x – 1)(x + 1)$, $(x – 1)(x^2 + x + 1)$, and $(x – 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
LAFS.910.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
LAFS.910.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.
LAFS.910.RST.3.7:	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LAFS.910.SL.1.1:	Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed. c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions. d. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.
LAFS.910.SL.1.2:	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
LAFS.910.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.
LAFS.910.SL.2.4:	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
	Write arguments focused on *discipline-specific content.* a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s)

LAFS.910.WHST.1.1:	and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns. c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.910.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.910.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

VERSION DESCRIPTION

The fundamental purpose of this course is to formalize and extend the mathematics that students learned in the middle grades. The critical areas, called units, deepen and extend understanding of linear and exponential relationships by contrasting them with each other and by applying linear models to data that exhibit a linear trend, and students engage in methods for analyzing, solving, and using quadratic functions. The Standards for Mathematical Practice apply throughout each course and, together with the content standards, prescribe that students experience mathematics as a coherent, useful, and logical subject that makes use of their ability to make sense of problem situations.

Unit 1- Relationships Between Quantities and Reasoning with Equations: By the end of eighth grade, students have learned to solve linear equations in one variable and have applied graphical and algebraic methods to analyze and solve systems of linear equations in two variables. Now, students analyze and explain the process of solving an equation. Students develop fluency writing, interpreting, and translating between various forms of linear equations and inequalities, and using them to solve problems. They master the solution of linear equations and apply related solution techniques and the laws of exponents to the creation and solution of simple exponential equations.

Unit 2- Linear and Exponential Relationships: In earlier grades, students define, evaluate, and compare functions, and use them to model relationships between quantities. In this unit, students will learn function notation and develop the concepts of domain and range. They explore many examples of functions, including sequences; they interpret functions given graphically, numerically, symbolically, and verbally, translate between representations, and understand the limitations of various representations. Students build on and informally extend their understanding of integer exponents to consider exponential functions. They compare and contrast linear and exponential functions, distinguishing between additive and multiplicative change. Students explore systems of equations and inequalities, and they find and interpret their solutions. They interpret arithmetic sequences as linear functions and geometric sequences as exponential functions.

Unit 3- Descriptive Statistics: This unit builds upon students prior experiences with data, providing students with more formal means of assessing how a model fits data. Students use regression techniques to describe and approximate linear relationships between quantities. They use graphical representations and knowledge of the context to make judgments about the appropriateness of linear models. With linear models, they look at residuals to analyze the goodness of fit.

Unit 4- Expressions and Equations: In this unit, students build on their knowledge from unit 2, where they extended the laws of exponents to rational exponents. Students apply this new understanding of number and strengthen their ability to see structure in and create quadratic and exponential expressions. They create and solve equations, inequalities, and systems of equations involving quadratic expressions.

Unit 5- Quadratic Functions and Modeling: In this unit, students consider quadratic functions, comparing the key characteristics of quadratic functions to those of linear and exponential functions. They select from among these functions to model phenomena. Students learn to anticipate the graph of a quadratic function by interpreting various forms of quadratic expressions. In particular, they identify the real solutions of a quadratic equation as the zeros of a related quadratic function. Students expand their experience with functions to include more specialized functions absolute value, step, and those that are piece wise-defined.

GENERAL NOTES

Fluency Recommendations

A/G- Algebra I students become fluent in solving characteristic problems involving the analytic geometry of lines, such as writing down the equation of a line given a point and a slope. Such fluency can support them in solving less routine mathematical problems involving linearity, as well as in modeling linear phenomena (including modeling using systems of linear inequalities in two variables).

A-APR.1- Fluency in adding, subtracting, and multiplying polynomials supports students throughout their work in Algebra, as well as in their symbolic work with functions. Manipulation can be more mindful when it is fluent.

A-SSE.1b- Fluency in transforming expressions and chunking (seeing parts of an expression as a single object) is essential in factoring, completing the square, and other mindful algebraic calculations.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:
https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

Additional Instructional Resources:
A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGI/cms/review.html?Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

Florida Standards Implementation Guide Focus Section:

The Mathematics Florida Standards Implementation Guide was created to support the teaching and learning of the Mathematics Florida Standards. The guide is compartmentalized into three components: focus, coherence, and rigor.Focus means narrowing the scope of content in each grade or course, so students achieve higher levels of understanding and experience math concepts more deeply. The Mathematics standards allow for the teaching and learning of mathematical concepts focused around major clusters at each grade level, enhanced by supporting and additional clusters. The major, supporting and additional clusters are identified, in relation to each grade or course. The cluster designations for this course are below.

Major Clusters

MAFS.912.N-RN.1 Extend the properties of exponents to rational exponents.

MAFS.912.A-APR.1 Perform arithmetic operations on polynomials.

MAFS.912.A-CED.1 Create equations that describe numbers or relationships.

MAFS.912.A-REI.1 Understand solving equations as a process of reasoning and explain the reasoning.

MAFS.912.A-REI.2 Solve equations and inequalities in one variable.

MAFS.912.A-REI.4 Represent and solve equations and inequalities graphically.

MAFS.912.A-SSE.1 Interpret the structure of expressions.

MAFS.912.F-IF.1 Understand the concept of a function and use function notation.

MAFS.912.F-IF.2 Interpret functions that arise in applications in terms of the context.

MAFS.912.S-ID.3 Interpret linear models.

Supporting Clusters

MAFS.912.N-Q.1 Reason quantitatively and use units to solve problems.

MAFS.912.A-APR.2 Understand the relationship between zeros and factors of polynomials.

MAFS.912.A-SSE.2 Write expressions in equivalent forms to solve problems.

MAFS.912.F-BF.1 Build a function that models a relationships between two quantities.

MAFS.912.F-IF.3 Analyze functions using different representations.

MAFS.912.F-LE.1 Construct and compare linear, quadratic, and exponential models and solve problems.

MAFS.912.F-LE.2 Interpret expressions for functions in terms of the situation they model.

MAFS.912.S-ID.2 Summarize, represent, and interpret data on two categorical and quantitative variables.

Additional Clusters

MAFS.912.N-RN.2 Use properties and rational and irrational numbers.

MAFS.912.A-REI.3 Solve systems of equations.

MAFS.912.F-BF.2 Build new functions from existing functions.

MAFS.912.S-ID.1 Summarize, represent, and interpret data on a single count or measurement variable.

Note: Clusters should not be sorted from major to supporting and then taught in that order. To do so would strip the coherence of the mathematical ideas and miss the opportunity to enhance the major work of the grade with the supporting and additional clusters.

GENERAL INFORMATION

Course Number: 1200320

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Algebra >

Abbreviated Title: ALG 1 HON

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:
- Honors
- Class Size Core Required

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 9,10,11,12

Educator Certifications

Mathematics (Grades 6-12)
Middle Grades Mathematics (Middle Grades 5-9)

Equivalent Courses

1200310-Algebra 1 Equivalency start year: 2014
1200386-Pre-Advanced Placement Algebra 1 Equivalency start year: 2018

Algebra 1 Honors (#1200320) 2022 - And Beyond

Course Standards

Name	Description
MA.912.AR.1.1:	Identify and interpret parts of an equation or expression that represent a quantity in terms of a mathematical or real-world context, including viewing one or more of its parts as a single entity. **Clarifications:** *Clarification 1:* Parts of an expression include factors, terms, constants, coefficients and variables. *Clarification 2:* Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.1.2:	Rearrange equations or formulas to isolate a quantity of interest. **Clarifications:** *Clarification 1*: Instruction includes using formulas for temperature, perimeter, area and volume; using equations for linear (standard, slope-intercept and point-slope forms) and quadratic (standard, factored and vertex forms) functions. *Clarification 2*: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.1.3:	Add, subtract and multiply polynomial expressions with rational number coefficients. **Clarifications:** *Clarification 1: I*nstruction includes an understanding that when any of these operations are performed with polynomials the result is also a polynomial. *Clarification 2:* Within the Algebra 1 course, polynomial expressions are limited to 3 or fewer terms.
MA.912.AR.1.4:	Divide a polynomial expression by a monomial expression with rational number coefficients. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, polynomial expressions are limited to 3 or fewer terms.
MA.912.AR.1.7:	Rewrite a polynomial expression as a product of polynomials over the real number system. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, polynomial expressions are limited to 4 or fewer terms with integer coefficients.
MA.912.AR.2.1:	Given a real-world context, write and solve one-variable multi-step linear equations.
MA.912.AR.2.2:	Write a linear two-variable equation to represent the relationship between two quantities from a graph, a written description or a table of values within a mathematical or real-world context. **Clarifications:** *Clarification 1:* Instruction includes the use of standard form, slope-intercept form and point-slope form, and the conversion between these forms.
MA.912.AR.2.3:	Write a linear two-variable equation for a line that is parallel or perpendicular to a given line and goes through a given point. **Clarifications:** *Clarification 1:* Instruction focuses on recognizing that perpendicular lines have slopes that when multiplied result in -1 and that parallel lines have slopes that are the same. *Clarification 2:* Instruction includes representing a line with a pair of points on the coordinate plane or with an equation. *Clarification 3:* Problems include cases where one variable has a coefficient of zero.
MA.912.AR.2.4:	Given a table, equation or written description of a linear function, graph that function, and determine and interpret its key features. **Clarifications:** *Clarification 1*: Key features are limited to domain, range, intercepts and rate of change. *Clarification 2*: Instruction includes the use of standard form, slope-intercept form and point-slope form. *Clarification 3*: Instruction includes cases where one variable has a coefficient of zero. *Clarification 4*: Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation. *Clarification 5*: Within the Algebra 1 course, notations for domain and range are limited to inequality and set-builder notations.
MA.912.AR.2.5:	Solve and graph mathematical and real-world problems that are modeled with linear functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain, range, intercepts and rate of change. *Clarification 2*: Instruction includes the use of standard form, slope-intercept form and point-slope form. *Clarification 3*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation. *Clarification 4*: Within the Algebra 1 course, notations for domain, range and constraints are limited to inequality and set-builder. *Clarification 5*: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.2.6:	Given a mathematical or real-world context, write and solve one-variable linear inequalities, including compound inequalities. Represent solutions algebraically or graphically.

MA.912.AR.2.7:	Write two-variable linear inequalities to represent relationships between quantities from a graph or a written description within a mathematical or real-world context. **Clarifications:** *Clarification 1:* Instruction includes the use of standard form, slope-intercept form and point-slope form and any inequality symbol can be represented. *Clarification 2:* Instruction includes cases where one variable has a coefficient of zero.
MA.912.AR.2.8:	Given a mathematical or real-world context, graph the solution set to a two-variable linear inequality. **Clarifications:** *Clarification 1:* Instruction includes the use of standard form, slope-intercept form and point-slope form and any inequality symbol can be represented. *Clarification 2:* Instruction includes cases where one variable has a coefficient of zero.
MA.912.AR.3.1:	Given a mathematical or real-world context, write and solve one-variable quadratic equations over the real number system. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, instruction includes the concept of non-real answers, without determining non-real solutions. *Clarification 2:* Within this benchmark, the expectation is to solve by factoring techniques, taking square roots, the quadratic formula and completing the square.
MA.912.AR.3.4:	Write a quadratic function to represent the relationship between two quantities from a graph, a written description or a table of values within a mathematical or real-world context. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, a graph, written description or table of values must include the vertex and two points that are equidistant from the vertex. *Clarification 2*: Instruction includes the use of standard form, factored form and vertex form. *Clarification 3*: Within the Algebra 2 course, one of the given points must be the vertex or an *x*-intercept.
MA.912.AR.3.5:	Given the x-intercepts and another point on the graph of a quadratic function, write the equation for the function.
MA.912.AR.3.6:	Given an expression or equation representing a quadratic function, determine the vertex and zeros and interpret them in terms of a real-world context.
MA.912.AR.3.7:	Given a table, equation or written description of a quadratic function, graph that function, and determine and interpret its key features. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior; vertex; and symmetry. *Clarification 2*: Instruction includes the use of standard form, factored form and vertex form, and sketching a graph using the zeros and vertex. *Clarification 3*: Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation. *Clarification 4*: Within the Algebra 1 course, notations for domain and range are limited to inequality and set-builder.
MA.912.AR.3.8:	Solve and graph mathematical and real-world problems that are modeled with quadratic functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior; vertex; and symmetry. *Clarification 2*: Instruction includes the use of standard form, factored form and vertex form. *Clarification 3*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation. *Clarification 4*: Within the Algebra 1 course, notations for domain, range and constraints are limited to inequality and set-builder.
MA.912.AR.4.1:	Given a mathematical or real-world context, write and solve one-variable absolute value equations.
MA.912.AR.4.2:	Given a mathematical or real-world context, write and solve one-variable absolute value inequalities. Represent solutions algebraically or graphically.
MA.912.AR.4.3:	Given a table, equation or written description of an absolute value function, graph that function and determine its key features. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; vertex; end behavior and symmetry. *Clarification 2*: Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation. *Clarification 3*: Within the Algebra 1 course, notations for domain and range are limited to inequality and set-builder.
MA.912.AR.5.3:	Given a mathematical or real-world context, classify an exponential function as representing growth or decay. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, exponential functions are limited to the forms $f(x) = ab^x$, where *b* is a whole number greater than 1 or a unit fraction, or $f(x) = a(1 \pm r)^x$, where $0 < r < 1$.
MA.912.AR.5.4:	Write an exponential function to represent a relationship between two quantities from a graph, a written description or a table of values within a mathematical or real-world context. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, exponential functions are limited to the forms $f(x) = ab^x$, where *b* is a whole number greater than 1 or a unit fraction, or $f(x) = a(1 \pm r)^x$, where $0 < r < 1$. *Clarification 2:* Within the Algebra 1 course, tables are limited to having successive nonnegative integer inputs so that the function may be determined by finding ratios between successive outputs.

MA.912.AR.5.6:	Given a table, equation or written description of an exponential function, graph that function and determine its key features. **Clarifications:** *Clarification 1:* Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; constant percent rate of change; end behavior and asymptotes. *Clarification 2:* Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation. *Clarification 3:* Within the Algebra 1 course, notations for domain and range are limited to inequality and set-builder. *Clarification 4:* Within the Algebra 1 course, exponential functions are limited to the forms $f(x) = ab^x$, where *b* is a whole number greater than 1 or a unit fraction or $f(x) = a(1 \pm r)^x$, where $0 < r < 1$.
MA.912.AR.9.1:	Given a mathematical or real-world context, write and solve a system of two-variable linear equations algebraically or graphically. **Clarifications:** *Clarification 1*: Within this benchmark, the expectation is to solve systems using elimination, substitution and graphing. *Clarification 2*: Within the Algebra 1 course, the system is limited to two equations.
MA.912.AR.9.4:	Graph the solution set of a system of two-variable linear inequalities. **Clarifications:** *Clarification 1:* Instruction includes cases where one variable has a coefficient of zero. *Clarification 2:* Within the Algebra 1 course, the system is limited to two inequalities.
MA.912.AR.9.6:	Given a real-world context, represent constraints as systems of linear equations or inequalities. Interpret solutions to problems as viable or non-viable options. **Clarifications:** *Clarification 1*: Instruction focuses on analyzing a given function that models a real-world situation and writing constraints that are represented as linear equations or linear inequalities.
MA.912.DP.1.1:	Given a set of data, select an appropriate method to represent the data, depending on whether it is numerical or categorical data and on whether it is univariate or bivariate. **Clarifications:** *Clarification 1:* Instruction includes discussions regarding the strengths and weaknesses of each data display. *Clarification 2:* Numerical univariate includes histograms, stem-and-leaf plots, box plots and line plots; numerical bivariate includes scatter plots and line graphs; categorical univariate includes bar charts, circle graphs, line plots, frequency tables and relative frequency tables; and categorical bivariate includes segmented bar charts, joint frequency tables and joint relative frequency tables. *Clarification 3:* Instruction includes the use of appropriate units and labels and, where appropriate, using technology to create data displays.
MA.912.DP.1.2:	Interpret data distributions represented in various ways. State whether the data is numerical or categorical, whether it is univariate or bivariate and interpret the different components and quantities in the display. **Clarifications:** *Clarification 1*: Within the Probability and Statistics course, instruction includes the use of spreadsheets and technology.
MA.912.DP.1.3:	Explain the difference between correlation and causation in the contexts of both numerical and categorical data.
MA.912.DP.1.4:	Estimate a population total, mean or percentage using data from a sample survey; develop a margin of error through the use of simulation. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, the margin of error will be given.
MA.912.DP.2.4:	Fit a linear function to bivariate numerical data that suggests a linear association and interpret the slope and y-intercept of the model. Use the model to solve real-world problems in terms of the context of the data. **Clarifications:** *Clarification 1*: Instruction includes fitting a linear function both informally and formally with the use of technology. *Clarification 2*: Problems include making a prediction or extrapolation, inside and outside the range of the data, based on the equation of the line of fit.
MA.912.DP.2.5:	Given a scatter plot that represents bivariate numerical data, assess the fit of a given linear function by plotting and analyzing residuals. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, instruction includes determining the number of positive and negative residuals; the largest and smallest residuals; and the connection between outliers in the data set and the corresponding residuals.
MA.912.DP.2.6:	Given a scatter plot with a line of fit and residuals, determine the strength and direction of the correlation. Interpret strength and direction within a real-world context. **Clarifications:** *Clarification 1*: Instruction focuses on determining the direction by analyzing the slope and informally determining the strength by analyzing the residuals.
MA.912.DP.3.1:	Construct a two-way frequency table summarizing bivariate categorical data. Interpret joint and marginal frequencies and determine possible associations in terms of a real-world context.
MA.912.DP.3.2:	Given marginal and conditional relative frequencies, construct a two-way relative frequency table summarizing categorical bivariate data. **Clarifications:** *Clarification 1:* Construction includes cases where not all frequencies are given but enough are provided to be able to construct a two-way relative frequency table. *Clarification 2:* Instruction includes the use of a tree diagram when calculating relative frequencies to construct tables.
MA.912.DP.3.3:	Given a two-way relative frequency table or segmented bar graph summarizing categorical bivariate data, interpret joint, marginal and conditional relative frequencies in terms of a real-world context. **Clarifications:** *Clarification 1:* Instruction includes problems involving false positive and false negatives.

MA.912.F.1.1:	Given an equation or graph that defines a function, determine the function type. Given an input-output table, determine a function type that could represent it. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, functions represented as tables are limited to linear, quadratic and exponential. *Clarification 2:* Within the Algebra 1 course, functions represented as equations or graphs are limited to vertical or horizontal translations or reflections over the x-axis of the following parent functions: $f(x) = x$, $f(x) = x^2$, $f(x) = x^3$, $f(x) = \sqrt{x}$, $f(x) = \sqrt[3]{x}$, $f(x) = \lvert x \rvert$, $f(x) = 2^x$ and $f(x) = \left(\frac{1}{2}\right)^x$.
MA.912.F.1.2:	Given a function represented in function notation, evaluate the function for an input in its domain. For a real-world context, interpret the output. **Clarifications:** *Clarification 1*: Problems include simple functions in two-variables, such as f(x,y)=3x-2y. *Clarification 2*: Within the Algebra 1 course, functions are limited to one-variable such as f(x)=3x.
MA.912.F.1.3:	Calculate and interpret the average rate of change of a real-world situation represented graphically, algebraically or in a table over a specified interval. **Clarifications:** *Clarification 1*: Instruction includes making the connection to determining the slope of a particular line segment.
MA.912.F.1.5:	Compare key features of linear functions each represented algebraically, graphically, in tables or written descriptions. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; slope and end behavior.
MA.912.F.1.6:	Compare key features of linear and nonlinear functions each represented algebraically, graphically, in tables or written descriptions. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior and asymptotes. *Clarification 2*: Within the Algebra 1 course, functions other than linear, quadratic or exponential must be represented graphically. *Clarification 3*: Within the Algebra 1 course, instruction includes verifying that a quantity increasing exponentially eventually exceeds a quantity increasing linearly or quadratically.
MA.912.F.1.8:	Determine whether a linear, quadratic or exponential function best models a given real-world situation. **Clarifications:** *Clarification 1*: Instruction includes recognizing that linear functions model situations in which a quantity changes by a constant amount per unit interval; that quadratic functions model situations in which a quantity increases to a maximum, then begins to decrease or a quantity decreases to a minimum, then begins to increase; and that exponential functions model situations in which a quantity grows or decays by a constant percent per unit interval. *Clarification 2*: Within this benchmark, the expectation is to identify the type of function from a written description or table.
MA.912.F.2.1:	Identify the effect on the graph or table of a given function after replacing *f(x)* by *f(x)+k*,*kf(x)*, *f(kx)* and *f(x+k)* for specific values of *k*. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, functions are limited to linear, quadratic and absolute value. *Clarification 2*: Instruction focuses on including positive and negative values for *k*.
MA.912.F.2.3:	Given the graph or table of f(x) and the graph or table of f(x)+k,kf(x), f(kx) and f(x+k), state the type of transformation and find the value of the real number k. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, functions are limited to linear, quadratic and absolute value.
MA.912.F.3.1:	Given a mathematical or real-world context, combine two functions, limited to linear and quadratic, using arithmetic operations. When appropriate, include domain restrictions for the new function. **Clarifications:** *Clarification 1*: Instruction includes representing domain restrictions with inequality notation, interval notation or set-builder notation. *Clarification 2*: Within the Algebra 1 Honors course, notations for domain and range are limited to inequality and set-builder.
MA.912.FL.3.2:	Solve real-world problems involving simple, compound and continuously compounded interest. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, interest is limited to simple and compound.
MA.912.FL.3.4:	Explain the relationship between simple interest and linear growth. Explain the relationship between compound interest and exponential growth and the relationship between continuously compounded interest and exponential growth. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, exponential growth is limited to compound interest.
MA.912.NSO.1.1:	Extend previous understanding of the Laws of Exponents to include rational exponents. Apply the Laws of Exponents to evaluate numerical expressions and generate equivalent numerical expressions involving rational exponents. **Clarifications:** *Clarification 1:* Instruction includes the use of technology when appropriate. *Clarification 2:* Refer to the K-12 Formulas (Appendix E) for the Laws of Exponents. *Clarification 3:* Instruction includes converting between expressions involving rational exponents and expressions involving radicals. *Clarification 4:*Within the Mathematics for Data and Financial Literacy course, it is not the expectation to generate equivalent numerical expressions.
MA.912.NSO.1.2:	Generate equivalent algebraic expressions using the properties of exponents.

MA.912.NSO.1.4:	Apply previous understanding of operations with rational numbers to add, subtract, multiply and divide numerical radicals. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, expressions are limited to a single arithmetic operation involving two square roots or two cube roots.
MA.K12.MTR.1.1:	Mathematicians who participate in effortful learning both individually and with others: • Analyze the problem in a way that makes sense given the task. • Ask questions that will help with solving the task. • Build perseverance by modifying methods as needed while solving a challenging task. • Stay engaged and maintain a positive mindset when working to solve tasks. • Help and support each other when attempting a new method or approach. **Clarifications:** Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: • Build understanding through modeling and using manipulatives. • Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. • Progress from modeling problems with objects and drawings to using algorithms and equations. • Express connections between concepts and representations. • Choose a representation based on the given context or purpose. **Clarifications:** Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations. **Clarifications:** Teachers who encourage students to complete tasks with mathematical fluency: • Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. • Offer multiple opportunities for students to practice efficient and generalizable methods. • Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: • Communicate mathematical ideas, vocabulary and methods effectively. • Analyze the mathematical thinking of others. • Compare the efficiency of a method to those expressed by others. • Recognize errors and suggest how to correctly solve the task. • Justify results by explaining methods and processes. • Construct possible arguments based on evidence. **Clarifications:** Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. **Clarifications:** Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems.

	• Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. **Clarifications:** Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems. • Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. **Clarifications:** Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. **Clarifications:** K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. **Clarifications:** See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. **Clarifications:** Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. **Clarifications:** In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think _______ because ______." The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. **Clarifications:** Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. **Clarifications:** In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

General Course Information and Notes

VERSION DESCRIPTION

In Algebra 1 Honors, instructional time will emphasize five areas: (1) performing operations with polynomials and radicals, and extending the Laws of Exponents to include rational exponents; (2) extending understanding of functions to linear, quadratic and exponential functions and using them to model and analyze real-world relationships; (3) solving quadratic equations in one variable and systems of linear equations and inequalities in two variables; (4) building functions, identifying their key features and representing them in various ways and (5) representing and interpreting categorical and numerical data with one and two variables.

All clarifications stated, whether general or specific to Algebra I Honors, are expectations for instruction of that benchmark.

Curricular content for all subjects must integrate critical-thinking, problem-solving, and workforce-literacy skills; communication, reading, and writing skills; mathematics skills; collaboration skills; contextual and applied-learning skills; technology-literacy skills; information and media-literacy skills; and civic-engagement skills.

GENERAL NOTES

Honors and Accelerated Level Course Note: Accelerated courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards
This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Number: 1200320

Course Path: **Section:** Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Algebra >

Abbreviated Title: ALG 1 HONORS

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:
- Honors
- Class Size Core Required

Course Type: Core Academic Course

Course Level: 3

Course Status: State Board Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Algebra 1

Educator Certifications

Mathematics (Grades 6-12)
Middle Grades Mathematics (Middle Grades 5-9)

Equivalent Courses

1200310-Algebra 1 Equivalency start year: 2014
1200386-Pre-Advanced Placement Algebra 1 Equivalency start year: 2018

Algebra 2 (#1200330) 2015 - 2022 (current)

Course Standards

Name	Description
MAFS.912.A-APR.1.1:	Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. **Clarifications:** **Algebra 1 - Fluency Recommendations** Fluency in adding, subtracting, and multiplying polynomials supports students throughout their work in algebra, as well as in their symbolic work with functions. Manipulation can be more mindful when it is fluent.
MAFS.912.A-APR.2.2:	Know and apply the Remainder Theorem: For a polynomial p(x) and a number a, the remainder on division by x – a is p(a), so p(a) = 0 if and only if (x – a) is a factor of p(x).
MAFS.912.A-APR.2.3:	Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.
MAFS.912.A-APR.3.4:	Prove polynomial identities and use them to describe numerical relationships. For example, the polynomial identity $(x^2 + y^2)^2 = (x^2 - y^2)^2 + (2xy)^2$ can be used to generate Pythagorean triples.
MAFS.912.A-APR.4.6:	Rewrite simple rational expressions in different forms; write a(x)/b(x) in the form q(x) + r(x)/b(x), where a(x), b(x), q(x), and r(x) are polynomials with the degree of r(x) less than the degree of b(x), using inspection, long division, or, for the more complicated examples, a computer algebra system.
MAFS.912.A-CED.1.1:	Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational, absolute, and exponential functions. ★
MAFS.912.A-CED.1.2:	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. ★
MAFS.912.A-CED.1.3:	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.* ★
MAFS.912.A-CED.1.4:	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law V = IR to highlight resistance R.* ★
MAFS.912.A-REI.1.1:	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
MAFS.912.A-REI.1.2:	Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.
MAFS.912.A-REI.2.4:	Solve quadratic equations in one variable. a. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form. b. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.
MAFS.912.A-REI.3.6:	Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
MAFS.912.A-REI.3.7:	Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. *For example, find the points of intersection between the line $y = -3x$ and the circle $x^2 + y^2 = 3$.*
MAFS.912.A-REI.4.11:	Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. ★
MAFS.912.A-SSE.1.1:	Interpret expressions that represent a quantity in terms of its context. ★ a. Interpret parts of an expression, such as terms, factors, and coefficients. b. Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret as the product of P and a factor not depending on P.*
MAFS.912.A-SSE.1.2:	Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.*
MAFS.912.A-SSE.2.3:	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.★ a. Factor a quadratic expression to reveal the zeros of the function it defines. b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. c. Use the properties of exponents to transform expressions for exponential functions. *For example the expression 1.15^t can be rewritten as $(1.15^{1/12})^{12t} \approx 1.012^{12t}$ to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.*
MAFS.912.A-SSE.2.4:	Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. *For example, calculate mortgage payments.* ★
	Write a function that describes a relationship between two quantities. ★ a. Determine an explicit expression, a recursive process, or steps for calculation from a context.

MAFS.912.F-BF.1.1:	b. Combine standard function types using arithmetic operations. *For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.* c. Compose functions. *For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time.*
MAFS.912.F-BF.1.2:	Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms. ★
MAFS.912.F-BF.2.3:	Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. *Include recognizing even and odd functions from their graphs and algebraic expressions for them.*
MAFS.912.F-BF.2.4:	Find inverse functions. a. Solve an equation of the form f(x) = c for a simple function f that has an inverse and write an expression for the inverse. *For example, f(x) =2 x^3 or f(x) = (x+1)/(x–1) for x ≠ 1.* b. Verify by composition that one function is the inverse of another. c. Read values of an inverse function from a graph or a table, given that the function has an inverse. d. Produce an invertible function from a non-invertible function by restricting the domain.
MAFS.912.F-BF.2.a:	Use the change of base formula.
MAFS.912.F-IF.2.4:	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.* ★
MAFS.912.F-IF.2.5:	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble engines in a factory, then the positive integers would be an appropriate domain for the function.* ★
MAFS.912.F-IF.2.6:	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. ★
MAFS.912.F-IF.3.7:	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★ a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift.
MAFS.912.F-IF.3.8:	Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. b. Use the properties of exponents to interpret expressions for exponential functions. *For example, identify percent rate of change in functions such as y =* $(1.02)^t$, *y =* $(0.97)^t$, *y =* $(1.01)^{12t}$, *y =* $(1.2)^{t/10}$, *and classify them as representing exponential growth or decay.*
MAFS.912.F-IF.3.9:	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.*
MAFS.912.F-LE.1.4:	For exponential models, express as a logarithm the solution to ab^{ct} = d where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology. ★
MAFS.912.F-LE.2.5:	Interpret the parameters in a linear or exponential function in terms of a context. ★
MAFS.912.F-TF.1.1:	Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle; Convert between degrees and radians.
MAFS.912.F-TF.1.2:	Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.
MAFS.912.F-TF.2.5:	Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline. ★
MAFS.912.F-TF.3.8:	Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it to calculate trigonometric ratios.
MAFS.912.G-GPE.1.2:	Derive the equation of a parabola given a focus and directrix.
MAFS.912.N-CN.1.1:	Know there is a complex number i such that $i^2 = -1$, and every complex number has the form a + bi with a and b real.
MAFS.912.N-CN.1.2:	Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.
MAFS.912.N-CN.3.7:	Solve quadratic equations with real coefficients that have complex solutions.
MAFS.912.N-Q.1.2:	Define appropriate quantities for the purpose of descriptive modeling. ★ **Clarifications:** **Algebra 1 Content Notes:** Working with quantities and the relationships between them provides grounding for work with expressions, equations, and functions.
MAFS.912.N-RN.1.1:	Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. *For example, we define* $5^{1/3}$ *to be the cube root of 5 because we want* $(5^{1/3})^3 = 5^{(1/3)3}$ *to hold, so* $(5^{1/3})^3$ *must equal 5.*
MAFS.912.N-RN.1.2:	Rewrite expressions involving radicals and rational exponents using the properties of exponents.
MAFS.912.S-CP.1.1:	Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events (“or,” “and,” “not”). ★
MAFS.912.S-CP.1.2:	Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent. ★
MAFS.912.S-CP.1.3:	Understand the conditional probability of A given B as P(A and B)/P(B), and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B. ★
	Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way

MAFS.912.S-CP.1.4:	table as a sample space to decide if events are independent and to approximate conditional probabilities. *For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.* ★
MAFS.912.S-CP.1.5:	Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. *For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.* ★
MAFS.912.S-CP.2.6:	Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model. ★
MAFS.912.S-CP.2.7:	Apply the Addition Rule, P(A or B) = P(A) + P(B) – P(A and B), and interpret the answer in terms of the model. ★
MAFS.912.S-IC.1.1:	Understand statistics as a process for making inferences about population parameters based on a random sample from that population. ★
MAFS.912.S-IC.1.2:	Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. *For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model* ★
MAFS.912.S-IC.2.3:	Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each. ★
MAFS.912.S-IC.2.4:	Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling. ★
MAFS.912.S-IC.2.5:	Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant. ★
MAFS.912.S-IC.2.6:	Evaluate reports based on data. ★
MAFS.912.S-ID.1.4:	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. ★
MAFS.K12.MP.1.1:	**Make sense of problems and persevere in solving them.** Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
MAFS.K12.MP.2.1:	**Reason abstractly and quantitatively**. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
MAFS.K12.MP.3.1:	**Construct viable arguments and critique the reasoning of others.** Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
MAFS.K12.MP.4.1:	**Model with mathematics.** Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
MAFS.K12.MP.5.1:	**Use appropriate tools strategically.** Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
	Attend to precision. Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful

MAFS.K12.MP.6.1:	about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
MAFS.K12.MP.7.1:	**Look for and make use of structure.** Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
MAFS.K12.MP.8.1:	**Look for and express regularity in repeated reasoning.** Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
LAFS.1112.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
LAFS.1112.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
LAFS.1112.RST.3.7:	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
LAFS.1112.WHST.1.1:	Write arguments focused on *discipline-specific content.* a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.1112.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.1112.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
LAFS.910.SL.1.1:	Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed. c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions. d. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.
LAFS.910.SL.1.2:	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
LAFS.910.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.
LAFS.910.SL.2.4:	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

VERSION DESCRIPTION

Building on their work with linear, quadratic, and exponential functions, students extend their repertoire of functions to include polynomial, rational, and radical functions. Students work closely with the expressions that define the functions, and continue to expand and hone their abilities to model situations and to solve equations, including solving quadratic equations over the set of complex numbers and solving exponential equations using the properties of logarithms. The Standards for Mathematical Practice apply throughout each course and, together with the content standards, prescribe that students experience mathematics as a coherent, useful, and logical subject that makes use of their ability to make sense of problem situations. The critical areas for this course, organized into five units, are as follows:

Unit 1- Polynomial, Rational, and Radical Relationships: This unit develops the structural similarities between the system of polynomials and the system of integers. Students draw on analogies between polynomial arithmetic and base-ten computation, focusing on properties of operations, particularly the distributive property. Students connect multiplication of polynomials with multiplication of multi-digit integers, and division of polynomials with long division of integers. Students identify zeros of polynomials, including complex zeros of quadratic polynomials, and make connections between zeros of polynomials and solutions of polynomial equations. The unit culminates with the fundamental theorem of algebra. A central theme of this unit is that the arithmetic of rational expressions is governed by the same rules as the arithmetic of rational numbers.

Unit 2- Trigonometric Functions: Building on their previous work with functions, and on their work with trigonometric ratios and circles in Geometry, students now use the coordinate plane to extend trigonometry to model periodic phenomena.

Unit 3- Modeling with Functions: In this unit students synthesize and generalize what they have learned about a variety of function families. They extend their work with exponential functions to include solving exponential equations with logarithms. They explore the effects of transformations on graphs of diverse functions, including functions arising in an application, in order to abstract the general principle that transformations on a graph always have the same effect regardless of the type of the underlying function. They identify appropriate types of functions to model a situation, they adjust parameters to improve the model, and they compare models by analyzing appropriateness of fit and making judgments about the domain over which a model is a good fit. The description of modeling as - the process of choosing and using mathematics and statistics to analyze empirical situations, to understand them better, and to make decisions' is at the heart of this unit. The narrative discussion and diagram of the modeling cycle should be considered when knowledge of functions, statistics, and geometry is applied in a modeling context.

Unit 4- Inferences and Conclusions from Data: In this unit, students see how the visual displays and summary statistics they learned in earlier grades relate to different types of data and to probability distributions. They identify different ways of collecting data, including sample surveys, experiments, and simulations, and the role that randomness and careful design play in the conclusions that can be drawn.

Unit 5- Applications of Probability: Building on probability concepts that began in the middle grades, students use the languages of set theory to expand their ability to compute and interpret theoretical and experimental probabilities for compound events, attending to mutually exclusive events, independent events, and conditional probability. Students should make use of geometric probability models wherever possible. They use probability to make informed decisions.

GENERAL NOTES

Fluency Recommendations

A-APR.6 This standard sets an expectation that students will divide polynomials with remainder by inspection in simple cases. For example, one can view the rational expression

$$\frac{x+4}{x+3}\ as\ \frac{x+4}{x+3}=\frac{(x+3)+1}{x+3}=1+\frac{1}{x+3}.$$

A-SSE.2 The ability to see structure in expressions and to use this structure to rewrite expressions is a key skill in everything from advanced factoring (e.g., grouping) to summing series to the rewriting of rational expressions to examine the end behavior of the corresponding rational function.

F- IF.3 Fluency in translating between recursive definitions and closed forms is helpful when dealing with many problems involving sequences and series, with applications ranging from fitting functions to tables to problems in finance.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

Additional Instructional Resources:
A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGI/cms/review.html?Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

Course Number: 1200330

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Algebra >

Abbreviated Title: ALG 2

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Type: Core Academic Course

Course Level: 2

Course Status: Course Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Mathematics

Educator Certifications

Mathematics (Grades 6-12)

Algebra 2 (#1200330) 2022 - And Beyond

Course Standards

Name	Description
MA.912.AR.1.1:	Identify and interpret parts of an equation or expression that represent a quantity in terms of a mathematical or real-world context, including viewing one or more of its parts as a single entity. **Clarifications:** *Clarification 1:* Parts of an expression include factors, terms, constants, coefficients and variables. *Clarification 2:* Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.1.3:	Add, subtract and multiply polynomial expressions with rational number coefficients. **Clarifications:** *Clarification 1: I*nstruction includes an understanding that when any of these operations are performed with polynomials the result is also a polynomial. *Clarification 2:* Within the Algebra 1 course, polynomial expressions are limited to 3 or fewer terms.
MA.912.AR.1.5:	Divide polynomial expressions using long division, synthetic division or algebraic manipulation.
MA.912.AR.1.6:	Solve mathematical and real-world problems involving addition, subtraction, multiplication or division of polynomials.
MA.912.AR.1.8:	Rewrite a polynomial expression as a product of polynomials over the real or complex number system. **Clarifications:** *Clarification 1:* Instruction includes factoring a sum or difference of squares and a sum or difference of cubes.
MA.912.AR.1.9:	Apply previous understanding of rational number operations to add, subtract, multiply and divide rational algebraic expressions. **Clarifications:** *Clarification 1*: Instruction includes the connection to fractions and common denominators.
MA.912.AR.3.2:	Given a mathematical or real-world context, write and solve one-variable quadratic equations over the real and complex number systems. **Clarifications:** *Clarification 1*: Within this benchmark, the expectation is to solve by factoring techniques, taking square roots, the quadratic formula and completing the square.
MA.912.AR.3.3:	Given a mathematical or real-world context, write and solve one-variable quadratic inequalities over the real number system. Represent solutions algebraically or graphically.
MA.912.AR.3.4:	Write a quadratic function to represent the relationship between two quantities from a graph, a written description or a table of values within a mathematical or real-world context. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, a graph, written description or table of values must include the vertex and two points that are equidistant from the vertex. *Clarification 2*: Instruction includes the use of standard form, factored form and vertex form. *Clarification 3*: Within the Algebra 2 course, one of the given points must be the vertex or an *x*-intercept.
MA.912.AR.3.8:	Solve and graph mathematical and real-world problems that are modeled with quadratic functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior; vertex; and symmetry. *Clarification 2*: Instruction includes the use of standard form, factored form and vertex form. *Clarification 3*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation. *Clarification 4*: Within the Algebra 1 course, notations for domain, range and constraints are limited to inequality and set-builder.
MA.912.AR.3.9:	Given a mathematical or real-world context, write two-variable quadratic inequalities to represent relationships between quantities from a graph or a written description. **Clarifications:** *Clarification 1:* Instruction includes the use of standard form, factored form and vertex form where any inequality symbol can be represented.
MA.912.AR.3.10:	Given a mathematical or real-world context, graph the solution set to a two-variable quadratic inequality. **Clarifications:** *Clarification 1*: Instruction includes the use of standard form, factored form and vertex form where any inequality symbol can be represented.
MA.912.AR.4.2:	Given a mathematical or real-world context, write and solve one-variable absolute value inequalities. Represent solutions algebraically or graphically.
MA.912.AR.4.4:	Solve and graph mathematical and real-world problems that are modeled with absolute value functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; vertex; end behavior and symmetry. *Clarification 2*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder

	notation.
MA.912.AR.5.2:	Solve one-variable equations involving logarithms or exponential expressions. Interpret solutions as viable in terms of the context and identify any extraneous solutions.
MA.912.AR.5.4:	Write an exponential function to represent a relationship between two quantities from a graph, a written description or a table of values within a mathematical or real-world context. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, exponential functions are limited to the forms $f(x) = ab^x$, where *b* is a whole number greater than 1 or a unit fraction, or $f(x) = a(1 \pm r)^x$, where $0 < r < 1$. *Clarification 2:* Within the Algebra 1 course, tables are limited to having successive nonnegative integer inputs so that the function may be determined by finding ratios between successive outputs.
MA.912.AR.5.5:	Given an expression or equation representing an exponential function, reveal the constant percent rate of change per unit interval using the properties of exponents. Interpret the constant percent rate of change in terms of a real-world context.
MA.912.AR.5.7:	Solve and graph mathematical and real-world problems that are modeled with exponential functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; constant percent rate of change; end behavior and asymptotes. *Clarification 2*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation. *Clarification 3*: Instruction includes understanding that when the logarithm of the dependent variable is taken and graphed, the exponential function will be transformed into a linear function. *Clarification 4*: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.5.8:	Given a table, equation or written description of a logarithmic function, graph that function and determine its key features. **Clarifications:** *Clarification 1:* Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior; and asymptotes. *Clarification 2:* Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation.
MA.912.AR.5.9:	Solve and graph mathematical and real-world problems that are modeled with logarithmic functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior; and asymptotes. *Clarification 2*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation.
MA.912.AR.6.1:	Given a mathematical or real-world context, when suitable factorization is possible, solve one-variable polynomial equations of degree 3 or higher over the real and complex number systems.
MA.912.AR.6.5:	Sketch a rough graph of a polynomial function of degree 3 or higher using zeros, multiplicity and knowledge of end behavior.
MA.912.AR.7.1:	Solve one-variable radical equations. Interpret solutions as viable in terms of context and identify any extraneous solutions.
MA.912.AR.7.2:	Given a table, equation or written description of a square root or cube root function, graph that function and determine its key features. **Clarifications:** *Clarification 1:* Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior; and relative maximums and minimums. *Clarification 2:* Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation.
MA.912.AR.7.3:	Solve and graph mathematical and real-world problems that are modeled with square root or cube root functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior; and relative maximums and minimums. *Clarification 2*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation.
MA.912.AR.8.1:	Write and solve one-variable rational equations. Interpret solutions as viable in terms of the context and identify any extraneous solutions. **Clarifications:** *Clarification 1*: Within the Algebra 2 course, numerators and denominators are limited to linear and quadratic expressions.
MA.912.AR.8.2:	Given a table, equation or written description of a rational function, graph that function and determine its key features. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior; and asymptotes. *Clarification 2*: Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation. *Clarification 3*: Within the Algebra 2 course, numerators and denominators are limited to linear and quadratic expressions.
	Solve and graph mathematical and real-world problems that are modeled with rational functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative;

MA.912.AR.8.3:	end behavior; and asymptotes. *Clarification 2*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation. *Clarification 3*: Instruction includes using rational functions to represent inverse proportional relationships. *Clarification 4*: Within the Algebra 2 course, numerators and denominators are limited to linear and quadratic expressions.
MA.912.AR.9.2:	Given a mathematical or real-world context, solve a system consisting of a two-variable linear equation and a non-linear equation algebraically or graphically.
MA.912.AR.9.3:	Given a mathematical or real-world context, solve a system consisting of two-variable linear or non-linear equations algebraically or graphically. **Clarifications:** *Clarification 1*: Within the Algebra 2 course, non-linear equations are limited to quadratic equations.
MA.912.AR.9.5:	Graph the solution set of a system of two-variable inequalities. **Clarifications:** *Clarification 1:* Within the Algebra 2 course, two-variable inequalities are limited to linear and quadratic.
MA.912.AR.9.7:	Given a real-world context, represent constraints as systems of linear and non-linear equations or inequalities. Interpret solutions to problems as viable or non-viable options. **Clarifications:** *Clarification 1*: Instruction focuses on analyzing a given function that models a real-world situation and writing constraints that are represented as non-linear equations or non-linear inequalities. *Clarification 2*: Within the Algebra 2 course, non-linear equations and inequalities are limited to quadratic.
MA.912.DP.2.8:	Fit a quadratic function to bivariate numerical data that suggests a quadratic association and interpret any intercepts or the vertex of the model. Use the model to solve real-world problems in terms of the context of the data. **Clarifications:** *Clarification 1*: Problems include making a prediction or extrapolation, inside and outside the range of the data, based on the equation of the line of fit.
MA.912.DP.2.9:	Fit an exponential function to bivariate numerical data that suggests an exponential association. Use the model to solve real-world problems in terms of the context of the data. **Clarifications:** *Clarification 1*: Instruction focuses on determining whether an exponential model is appropriate by taking the logarithm of the dependent variable using spreadsheets and other technology. *Clarification 2*: Instruction includes determining whether the transformed scatterplot has an appropriate line of best fit, and interpreting the y-intercept and slope of the line of best fit. *Clarification 3*: Problems include making a prediction or extrapolation, inside and outside the range of the data, based on the equation of the line of fit.
MA.912.F.1.1:	Given an equation or graph that defines a function, determine the function type. Given an input-output table, determine a function type that could represent it. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, functions represented as tables are limited to linear, quadratic and exponential. *Clarification 2:* Within the Algebra 1 course, functions represented as equations or graphs are limited to vertical or horizontal translations or reflections over the x-axis of the following parent functions: $f(x) = x$, $f(x) = x^2$, $f(x) = x^3$, $f(x) = \sqrt{x}$, $f(x) = \sqrt[3]{x}$, $f(x) = \|x\|$, $f(x) = 2^x$ and $f(x) = \left(\frac{1}{2}\right)^x$.
MA.912.F.1.7:	Compare key features of two functions each represented algebraically, graphically, in tables or written descriptions. **Clarifications:** *Clarification 1*: Key features include domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior and asymptotes.
MA.912.F.1.9:	Determine whether a function is even, odd or neither when represented algebraically, graphically or in a table.
MA.912.F.2.2:	Identify the effect on the graph of a given function of two or more transformations defined by adding a real number to the x- or y- values or multiplying the x- or y- values by a real number.
MA.912.F.2.3:	Given the graph or table of f(x) and the graph or table of f(x)+k,kf(x), f(kx) and f(x+k), state the type of transformation and find the value of the real number k. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, functions are limited to linear, quadratic and absolute value.
MA.912.F.2.5:	Given a table, equation or graph that represents a function, create a corresponding table, equation or graph of the transformed function defined by adding a real number to the *x*- or *y*-values or multiplying the *x*- or *y*-values by a real number.
MA.912.F.3.2:	Given a mathematical or real-world context, combine two or more functions, limited to linear, quadratic, exponential and polynomial, using arithmetic operations. When appropriate, include domain restrictions for the new function. **Clarifications:** *Clarification 1*: Instruction includes representing domain restrictions with inequality notation, interval notation or set-builder notation. *Clarification 2*: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.F.3.4:	Represent the composition of two functions algebraically or in a table. Determine the domain and range of the composite function.
MA.912.F.3.6:	Determine whether an inverse function exists by analyzing tables, graphs and equations.
	Represent the inverse of a function algebraically, graphically or in a table. Use composition of functions to verify that one function is the inverse of the

MA.912.F.3.7:	other. **Clarifications:** *Clarification 1*: Instruction includes the understanding that a logarithmic function is the inverse of an exponential function.
MA.912.FL.3.1:	Compare simple, compound and continuously compounded interest over time. **Clarifications:** *Clarification 1*: Instruction includes taking into consideration the annual percentage rate (APR) when comparing simple and compound interest.
MA.912.FL.3.2:	Solve real-world problems involving simple, compound and continuously compounded interest. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, interest is limited to simple and compound.
MA.912.FL.3.4:	Explain the relationship between simple interest and linear growth. Explain the relationship between compound interest and exponential growth and the relationship between continuously compounded interest and exponential growth. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, exponential growth is limited to compound interest.
MA.912.NSO.1.3:	Generate equivalent algebraic expressions involving radicals or rational exponents using the properties of exponents. **Clarifications:** *Clarification 1*: Within the Algebra 2 course, radicands are limited to monomial algebraic expressions.
MA.912.NSO.1.5:	Add, subtract, multiply and divide algebraic expressions involving radicals. **Clarifications:** *Clarification 1*: Within the Algebra 2 course, radicands are limited to monomial algebraic expressions.
MA.912.NSO.1.6:	Given a numerical logarithmic expression, evaluate and generate equivalent numerical expressions using the properties of logarithms or exponents. **Clarifications:** *Clarification 1*: Within the Mathematics for Data and Financial Literacy Honors course, problem types focus on money and business.
MA.912.NSO.1.7:	Given an algebraic logarithmic expression, generate an equivalent algebraic expression using the properties of logarithms or exponents. **Clarifications:** *Clarification 1*: Within the Mathematics for Data and Financial Literacy Honors course, problem types focus on money and business.
MA.912.NSO.2.1:	Extend previous understanding of the real number system to include the complex number system. Add, subtract, multiply and divide complex numbers.
MA.K12.MTR.1.1:	Mathematicians who participate in effortful learning both individually and with others: • Analyze the problem in a way that makes sense given the task. • Ask questions that will help with solving the task. • Build perseverance by modifying methods as needed while solving a challenging task. • Stay engaged and maintain a positive mindset when working to solve tasks. • Help and support each other when attempting a new method or approach. **Clarifications:** Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: • Build understanding through modeling and using manipulatives. • Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. • Progress from modeling problems with objects and drawings to using algorithms and equations. • Express connections between concepts and representations. • Choose a representation based on the given context or purpose. **Clarifications:** Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations. **Clarifications:** Teachers who encourage students to complete tasks with mathematical fluency: • Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. • Offer multiple opportunities for students to practice efficient and generalizable methods. • Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.

MA.K12.MTR.4.1:	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: • Communicate mathematical ideas, vocabulary and methods effectively. • Analyze the mathematical thinking of others. • Compare the efficiency of a method to those expressed by others. • Recognize errors and suggest how to correctly solve the task. • Justify results by explaining methods and processes. • Construct possible arguments based on evidence. **Clarifications:** Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. **Clarifications:** Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. **Clarifications:** Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems. • Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. **Clarifications:** Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. **Clarifications:** K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
	Read and comprehend grade-level complex texts proficiently.

ELA.K12.EE.2.1:	**Clarifications:** See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. **Clarifications:** Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like “Why is the girl smiling?” or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. **Clarifications:** In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: “I think _______ because ______.” The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. **Clarifications:** Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. **Clarifications:** In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

General Course Information and Notes

VERSION DESCRIPTION

In Algebra 2, instructional time will emphasize five areas: (1) extending arithmetic operations with algebraic expressions to include radical and rational expressions and polynomial division; (2) graphing and analyzing functions including polynomials, absolute value, radical, rational, exponential and logarithmic; (3) building functions using compositions, inverses and transformations; (4) extending systems of equations and inequalities to include non-linear expressions and (5) developing understanding of the complex number system, including complex numbers as roots of polynomial equations.

All clarifications stated, whether general or specific to Algebra 2, are expectations for instruction of that benchmark

Curricular content for all subjects must integrate critical-thinking, problem-solving, and workforce-literacy skills; communication, reading, and writing skills; mathematics skills; collaboration skills; contextual and applied-learning skills; technology-literacy skills; information and media-literacy skills; and civic-engagement skills.

GENERAL NOTES

Florida’s Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards
This course includes Florida’s B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL’s need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Number: 1200330

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Algebra >

Abbreviated Title: ALG 2

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- Class Size Core Required

Course Type: Core Academic Course

Course Level: 2

Course Status: State Board Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Mathematics

Educator Certifications

Mathematics (Grades 6-12)

Algebra 2 Honors (#1200340) 2015 - 2022 (current)

Course Standards

Name	Description
MAFS.912.A-APR.1.1:	Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. **Clarifications:** **Algebra 1 - Fluency Recommendations** Fluency in adding, subtracting, and multiplying polynomials supports students throughout their work in algebra, as well as in their symbolic work with functions. Manipulation can be more mindful when it is fluent.
MAFS.912.A-APR.2.2:	Know and apply the Remainder Theorem: For a polynomial p(x) and a number a, the remainder on division by x – a is p(a), so p(a) = 0 if and only if (x – a) is a factor of p(x).
MAFS.912.A-APR.2.3:	Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.
MAFS.912.A-APR.3.4:	Prove polynomial identities and use them to describe numerical relationships. For example, the polynomial identity $(x^2 + y^2)^2 = (x^2 – y^2)^2 + (2xy)^2$ can be used to generate Pythagorean triples.
MAFS.912.A-APR.3.5:	Know and apply the Binomial Theorem for the expansion of (x in powers of x and y for a positive integer n, where x and y are any numbers, with coefficients determined for example by pascal's triangle.
MAFS.912.A-APR.4.6:	Rewrite simple rational expressions in different forms; write a(x)/b(x) in the form q(x) + r(x)/b(x), where a(x), b(x), q(x), and r(x) are polynomials with the degree of r(x) less than the degree of b(x), using inspection, long division, or, for the more complicated examples, a computer algebra system.
MAFS.912.A-APR.4.7:	Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.
MAFS.912.A-CED.1.1:	Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational, absolute, and exponential functions. ★
MAFS.912.A-CED.1.2:	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. ★
MAFS.912.A-CED.1.3:	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.* ★
MAFS.912.A-CED.1.4:	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law V = IR to highlight resistance R.* ★
MAFS.912.A-REI.1.1:	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
MAFS.912.A-REI.1.2:	Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.
MAFS.912.A-REI.2.4:	Solve quadratic equations in one variable. a. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x – p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form. b. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as *a* ± *bi* for real numbers a and b.
MAFS.912.A-REI.3.6:	Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
MAFS.912.A-REI.3.7:	Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. *For example, find the points of intersection between the line* $y = –3x$ *and the circle* $x^2 + y^2 = 3$.
MAFS.912.A-REI.4.11:	Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. ★
MAFS.912.A-SSE.1.1:	Interpret expressions that represent a quantity in terms of its context. ★ a. Interpret parts of an expression, such as terms, factors, and coefficients. b. Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret as the product of P and a factor not depending on P.*
MAFS.912.A-SSE.1.2:	Use the structure of an expression to identify ways to rewrite it. *For example, see* $x^4 - y^4$ *as* $(x^2)^2 – (y^2)^2$*, thus recognizing it as a difference of squares that can be factored as* $(x^2 – y^2)(x^2 + y^2)$.
MAFS.912.A-SSE.2.3:	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.★ a. Factor a quadratic expression to reveal the zeros of the function it defines. b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. c. Use the properties of exponents to transform expressions for exponential functions. *For example the expression* 1.15^t *can be rewritten as* $(1.15^{1/12})^{12t} \approx 1.012^{12t}$ *to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.*

MAFS.912.A-SSE.2.4:	Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. *For example, calculate mortgage payments.* ★
MAFS.912.F-BF.1.1:	Write a function that describes a relationship between two quantities. ★ a. Determine an explicit expression, a recursive process, or steps for calculation from a context. b. Combine standard function types using arithmetic operations. *For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.* c. Compose functions. *For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time.*
MAFS.912.F-BF.1.2:	Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms. ★
MAFS.912.F-BF.2.3:	Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. *Include recognizing even and odd functions from their graphs and algebraic expressions for them.*
MAFS.912.F-BF.2.4:	Find inverse functions. a. Solve an equation of the form f(x) = c for a simple function f that has an inverse and write an expression for the inverse. *For example, $f(x) = 2x^3$ or $f(x) = (x+1)/(x-1)$ for $x \neq 1$.* b. Verify by composition that one function is the inverse of another. c. Read values of an inverse function from a graph or a table, given that the function has an inverse. d. Produce an invertible function from a non-invertible function by restricting the domain.
MAFS.912.F-BF.2.a:	Use the change of base formula.
MAFS.912.F-IF.2.4:	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.* ★
MAFS.912.F-IF.2.5:	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble engines in a factory, then the positive integers would be an appropriate domain for the function.* ★
MAFS.912.F-IF.2.6:	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. ★
MAFS.912.F-IF.3.7:	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★ a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift.
MAFS.912.F-IF.3.8:	Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. b. Use the properties of exponents to interpret expressions for exponential functions. *For example, identify percent rate of change in functions such as $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)^{12t}$, $y = (1.2)^{t/10}$, and classify them as representing exponential growth or decay.*
MAFS.912.F-IF.3.9:	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.*
MAFS.912.F-LE.1.4:	For exponential models, express as a logarithm the solution to ab^{ct} = d where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology. ★
MAFS.912.F-LE.2.5:	Interpret the parameters in a linear or exponential function in terms of a context. ★
MAFS.912.F-TF.1.1:	Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle; Convert between degrees and radians.
MAFS.912.F-TF.1.2:	Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.
MAFS.912.F-TF.2.5:	Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline. ★
MAFS.912.F-TF.3.8:	Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it to calculate trigonometric ratios.
MAFS.912.G-GPE.1.2:	Derive the equation of a parabola given a focus and directrix.
MAFS.912.N-CN.1.1:	Know there is a complex number i such that $i^2 = -1$, and every complex number has the form a + bi with a and b real.
MAFS.912.N-CN.1.2:	Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.
MAFS.912.N-CN.3.7:	Solve quadratic equations with real coefficients that have complex solutions.
MAFS.912.N-CN.3.8:	Extend polynomial identities to the complex numbers. *For example, rewrite $x^2 + 4$ as $(x + 2i)(x - 2i)$.*
MAFS.912.N-CN.3.9:	Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.
MAFS.912.N-Q.1.2:	Define appropriate quantities for the purpose of descriptive modeling. ★ **Clarifications:** **Algebra 1 Content Notes:** Working with quantities and the relationships between them provides grounding for work with expressions, equations, and functions.
MAFS.912.N-RN.1.1:	Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. *For example, we define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5^{(1/3)3}$ to hold, so $(5^{1/3})^3$ must equal 5.*
MAFS.912.N-RN.1.2:	Rewrite expressions involving radicals and rational exponents using the properties of exponents.

MAFS.912.S-CP.1.1:	Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not"). ★
MAFS.912.S-CP.1.2:	Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent. ★
MAFS.912.S-CP.1.3:	Understand the conditional probability of A given B as P(A and B)/P(B), and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B. ★
MAFS.912.S-CP.1.4:	Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. *For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.* ★
MAFS.912.S-CP.1.5:	Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. *For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.* ★
MAFS.912.S-CP.2.6:	Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model. ★
MAFS.912.S-CP.2.7:	Apply the Addition Rule, P(A or B) = P(A) + P(B) – P(A and B), and interpret the answer in terms of the model. ★
MAFS.912.S-CP.2.8:	Apply the general Multiplication Rule in a uniform probability model, P(A and B) = P(A)P(B|A) = P(B)P(A|B), and interpret the answer in terms of the model. ★
MAFS.912.S-CP.2.9:	Use permutations and combinations to compute probabilities of compound events and solve problems. ★
MAFS.912.S-IC.1.1:	Understand statistics as a process for making inferences about population parameters based on a random sample from that population. ★
MAFS.912.S-IC.1.2:	Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. *For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model* ★
MAFS.912.S-IC.2.3:	Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each. ★
MAFS.912.S-IC.2.4:	Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling. ★
MAFS.912.S-IC.2.5:	Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant. ★
MAFS.912.S-IC.2.6:	Evaluate reports based on data. ★
MAFS.912.S-ID.1.4:	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. ★
MAFS.912.S-MD.2.6:	Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator). ★
MAFS.912.S-MD.2.7:	Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game). ★
MAFS.K12.MP.1.1:	**Make sense of problems and persevere in solving them.** Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
MAFS.K12.MP.2.1:	**Reason abstractly and quantitatively**. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
MAFS.K12.MP.3.1:	**Construct viable arguments and critique the reasoning of others.** Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
MAFS.K12.MP.4.1:	**Model with mathematics.** Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
	Use appropriate tools strategically.

MAFS.K12.MP.5.1:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
MAFS.K12.MP.6.1:	**Attend to precision.** Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
MAFS.K12.MP.7.1:	**Look for and make use of structure.** Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
MAFS.K12.MP.8.1:	**Look for and express regularity in repeated reasoning.** Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
LAFS.1112.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
LAFS.1112.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
LAFS.1112.RST.3.7:	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
LAFS.1112.SL.1.1:	Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
LAFS.1112.SL.1.2:	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
LAFS.1112.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.
LAFS.1112.SL.2.4:	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
LAFS.1112.WHST.1.1:	Write arguments focused on *discipline-specific content.* a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.1112.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.1112.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

VERSION DESCRIPTION

Building on their work with linear, quadratic, and exponential functions, students extend their repertoire of functions to include polynomial, rational, and radical functions.2 Students work closely with the expressions that define the functions, and continue to expand and hone their abilities to model situations and to solve equations, including solving quadratic equations over the set of complex numbers and solving exponential equations using the properties of logarithms. The Mathematical Practice Standards apply throughout each course and, together with the content standards, prescribe that students experience mathematics as a coherent, useful, and logical subject that makes use of their ability to make sense of problem situations. The critical areas for this course, organized into four units, are as follows:

Unit 1- Polynomial, Rational, and Radical Relationships: This unit develops the structural similarities between the system of polynomials and the system of integers. Students draw on analogies between polynomial arithmetic and base-ten computation, focusing on properties of operations, particularly the distributive property. Students connect multiplication of polynomials with multiplication of multi-digit integers, and division of polynomials with long division of integers. Students identify zeros of polynomials, including complex zeros of quadratic polynomials, and make connections between zeros of polynomials and solutions of polynomial equations. The unit culminates with the fundamental theorem of algebra. A central theme of this unit is that the arithmetic of rational expressions is governed by the same rules as the arithmetic of rational numbers.

Unit 2- Trigonometric Functions: Building on their previous work with functions, and on their work with trigonometric ratios and circles in Geometry, students now use the coordinate plane to extend trigonometry to model periodic phenomena.

Unit 3- Modeling with Functions: In this unit students synthesize and generalize what they have learned about a variety of function families. They extend their work with exponential functions to include solving exponential equations with logarithms. They explore the effects of transformations on graphs of diverse functions, including functions arising in an application, in order to abstract the general principle that transformations on a graph always have the same effect regardless of the type of the underlying function. They identify appropriate types of functions to model a situation, they adjust parameters to improve the model, and they compare models by analyzing appropriateness of fit and making judgments about the domain over which a model is a good fit. The description of modeling as the process of choosing and using mathematics and statistics to analyze empirical situations, to understand them better, and to make decisions' is at the heart of this unit. The narrative discussion and diagram of the modeling cycle should be considered when knowledge of functions, statistics, and geometry is applied in a modeling context.

Unit 4- Inferences and Conclusions from Data: In this unit, students see how the visual displays and summary statistics they learned in earlier grades relate to different types of data and to probability distributions. They identify different ways of collecting data, including sample surveys, experiments, and simulations, and the role that randomness and careful design play in the conclusions that can be drawn.

Unit 5- Applications of Probability: Building on probability concepts that began in the middle grades, students use the languages of set theory to expand their ability to compute and interpret theoretical and experimental probabilities for compound events, attending to mutually exclusive events, independent events, and conditional probability. Students should make use of geometric probability models wherever possible. They use probability to make informed decisions.

GENERAL NOTES

Fluency Recommendations

A-APR.6 This standard sets an expectation that students will divide polynomials with remainder by inspection in simple cases. For example, one can view the rational expression.

A-SSE.2 The ability to see structure in expressions and to use this structure to rewrite expressions is a key skill in everything from advanced factoring (e.g., grouping) to summing series to the rewriting of rational expressions to examine the end behavior of the corresponding rational function.

F-IF.3 Fluency in translating between recursive definitions and closed forms is helpful when dealing with many problems involving sequences and series, with applications ranging from fitting functions to tables to problems in finance.

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

Additional Instructional Resources:
A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGI/cms/review.html?Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

Course Number: 1200340

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Algebra >

Abbreviated Title: ALG 2 HON

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- Honors

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Mathematics

Educator Certifications

Mathematics (Grades 6-12)

Algebra 2 Honors (#1200340) 2022 - And Beyond

Course Standards

Name	Description
MA.912.AR.1.1:	Identify and interpret parts of an equation or expression that represent a quantity in terms of a mathematical or real-world context, including viewing one or more of its parts as a single entity. **Clarifications:** *Clarification 1:* Parts of an expression include factors, terms, constants, coefficients and variables. *Clarification 2:* Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.1.3:	Add, subtract and multiply polynomial expressions with rational number coefficients. **Clarifications:** *Clarification 1: I*nstruction includes an understanding that when any of these operations are performed with polynomials the result is also a polynomial. *Clarification 2:* Within the Algebra 1 course, polynomial expressions are limited to 3 or fewer terms.
MA.912.AR.1.5:	Divide polynomial expressions using long division, synthetic division or algebraic manipulation.
MA.912.AR.1.6:	Solve mathematical and real-world problems involving addition, subtraction, multiplication or division of polynomials.
MA.912.AR.1.8:	Rewrite a polynomial expression as a product of polynomials over the real or complex number system. **Clarifications:** *Clarification 1:* Instruction includes factoring a sum or difference of squares and a sum or difference of cubes.
MA.912.AR.1.9:	Apply previous understanding of rational number operations to add, subtract, multiply and divide rational algebraic expressions. **Clarifications:** *Clarification 1*: Instruction includes the connection to fractions and common denominators.
MA.912.AR.1.11:	Apply the Binomial Theorem to create equivalent polynomial expressions. **Clarifications:** *Clarification 1*: Instruction includes the connection to Pascal's Triangle and to combinations.
MA.912.AR.3.2:	Given a mathematical or real-world context, write and solve one-variable quadratic equations over the real and complex number systems. **Clarifications:** *Clarification 1*: Within this benchmark, the expectation is to solve by factoring techniques, taking square roots, the quadratic formula and completing the square.
MA.912.AR.3.3:	Given a mathematical or real-world context, write and solve one-variable quadratic inequalities over the real number system. Represent solutions algebraically or graphically.
MA.912.AR.3.4:	Write a quadratic function to represent the relationship between two quantities from a graph, a written description or a table of values within a mathematical or real-world context. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, a graph, written description or table of values must include the vertex and two points that are equidistant from the vertex. *Clarification 2*: Instruction includes the use of standard form, factored form and vertex form. *Clarification 3*: Within the Algebra 2 course, one of the given points must be the vertex or an *x*-intercept.
MA.912.AR.3.8:	Solve and graph mathematical and real-world problems that are modeled with quadratic functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior; vertex; and symmetry. *Clarification 2*: Instruction includes the use of standard form, factored form and vertex form. *Clarification 3*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation. *Clarification 4*: Within the Algebra 1 course, notations for domain, range and constraints are limited to inequality and set-builder.
MA.912.AR.3.9:	Given a mathematical or real-world context, write two-variable quadratic inequalities to represent relationships between quantities from a graph or a written description. **Clarifications:** *Clarification 1:* Instruction includes the use of standard form, factored form and vertex form where any inequality symbol can be represented.
MA.912.AR.3.10:	Given a mathematical or real-world context, graph the solution set to a two-variable quadratic inequality. **Clarifications:** *Clarification 1*: Instruction includes the use of standard form, factored form and vertex form where any inequality symbol can be represented.
MA.912.AR.4.2:	Given a mathematical or real-world context, write and solve one-variable absolute value inequalities. Represent solutions algebraically or graphically.
	Solve and graph mathematical and real-world problems that are modeled with absolute value functions. Interpret key features and determine constraints in terms of the context.

MA.912.AR.4.4:	**Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; vertex; end behavior and symmetry. *Clarification 2*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation.
MA.912.AR.5.2:	Solve one-variable equations involving logarithms or exponential expressions. Interpret solutions as viable in terms of the context and identify any extraneous solutions.
MA.912.AR.5.4:	Write an exponential function to represent a relationship between two quantities from a graph, a written description or a table of values within a mathematical or real-world context. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, exponential functions are limited to the forms $f(x) = ab^x$, where *b* is a whole number greater than 1 or a unit fraction, or $f(x) = a(1 \pm r)^x$, where $0 < r < 1$. *Clarification 2:* Within the Algebra 1 course, tables are limited to having successive nonnegative integer inputs so that the function may be determined by finding ratios between successive outputs.
MA.912.AR.5.5:	Given an expression or equation representing an exponential function, reveal the constant percent rate of change per unit interval using the properties of exponents. Interpret the constant percent rate of change in terms of a real-world context.
MA.912.AR.5.7:	Solve and graph mathematical and real-world problems that are modeled with exponential functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; constant percent rate of change; end behavior and asymptotes. *Clarification 2*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation. *Clarification 3*: Instruction includes understanding that when the logarithm of the dependent variable is taken and graphed, the exponential function will be transformed into a linear function. *Clarification 4*: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.5.8:	Given a table, equation or written description of a logarithmic function, graph that function and determine its key features. **Clarifications:** *Clarification 1:* Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior; and asymptotes. *Clarification 2:* Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation.
MA.912.AR.5.9:	Solve and graph mathematical and real-world problems that are modeled with logarithmic functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior; and asymptotes. *Clarification 2*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation.
MA.912.AR.6.1:	Given a mathematical or real-world context, when suitable factorization is possible, solve one-variable polynomial equations of degree 3 or higher over the real and complex number systems.
MA.912.AR.6.2:	Explain and apply the Remainder Theorem to solve mathematical and real-world problems.
MA.912.AR.6.5:	Sketch a rough graph of a polynomial function of degree 3 or higher using zeros, multiplicity and knowledge of end behavior.
MA.912.AR.7.1:	Solve one-variable radical equations. Interpret solutions as viable in terms of context and identify any extraneous solutions.
MA.912.AR.7.2:	Given a table, equation or written description of a square root or cube root function, graph that function and determine its key features. **Clarifications:** *Clarification 1:* Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior; and relative maximums and minimums. *Clarification 2:* Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation.
MA.912.AR.7.3:	Solve and graph mathematical and real-world problems that are modeled with square root or cube root functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior; and relative maximums and minimums. *Clarification 2*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation.
MA.912.AR.8.1:	Write and solve one-variable rational equations. Interpret solutions as viable in terms of the context and identify any extraneous solutions. **Clarifications:** *Clarification 1*: Within the Algebra 2 course, numerators and denominators are limited to linear and quadratic expressions.
MA.912.AR.8.2:	Given a table, equation or written description of a rational function, graph that function and determine its key features. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior; and asymptotes. *Clarification 2*: Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation. *Clarification 3*: Within the Algebra 2 course, numerators and denominators are limited to linear and quadratic expressions.

MA.912.AR.8.3:	Solve and graph mathematical and real-world problems that are modeled with rational functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior; and asymptotes. *Clarification 2*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation. *Clarification 3*: Instruction includes using rational functions to represent inverse proportional relationships. *Clarification 4*: Within the Algebra 2 course, numerators and denominators are limited to linear and quadratic expressions.
MA.912.AR.9.2:	Given a mathematical or real-world context, solve a system consisting of a two-variable linear equation and a non-linear equation algebraically or graphically.
MA.912.AR.9.3:	Given a mathematical or real-world context, solve a system consisting of two-variable linear or non-linear equations algebraically or graphically. **Clarifications:** *Clarification 1*: Within the Algebra 2 course, non-linear equations are limited to quadratic equations.
MA.912.AR.9.5:	Graph the solution set of a system of two-variable inequalities. **Clarifications:** *Clarification 1:* Within the Algebra 2 course, two-variable inequalities are limited to linear and quadratic.
MA.912.AR.9.7:	Given a real-world context, represent constraints as systems of linear and non-linear equations or inequalities. Interpret solutions to problems as viable or non-viable options. **Clarifications:** *Clarification 1*: Instruction focuses on analyzing a given function that models a real-world situation and writing constraints that are represented as non-linear equations or non-linear inequalities. *Clarification 2*: Within the Algebra 2 course, non-linear equations and inequalities are limited to quadratic.
MA.912.AR.9.10:	Solve and graph mathematical and real-world problems that are modeled with piecewise functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain, range, intercepts, asymptotes and end behavior. *Clarification 2*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation.
MA.912.AR.10.1:	Given a mathematical or real-world context, write and solve problems involving arithmetic sequences.
MA.912.AR.10.2:	Given a mathematical or real-world context, write and solve problems involving geometric sequences.
MA.912.DP.2.8:	Fit a quadratic function to bivariate numerical data that suggests a quadratic association and interpret any intercepts or the vertex of the model. Use the model to solve real-world problems in terms of the context of the data. **Clarifications:** *Clarification 1*: Problems include making a prediction or extrapolation, inside and outside the range of the data, based on the equation of the line of fit.
MA.912.DP.2.9:	Fit an exponential function to bivariate numerical data that suggests an exponential association. Use the model to solve real-world problems in terms of the context of the data. **Clarifications:** *Clarification 1*: Instruction focuses on determining whether an exponential model is appropriate by taking the logarithm of the dependent variable using spreadsheets and other technology. *Clarification 2*: Instruction includes determining whether the transformed scatterplot has an appropriate line of best fit, and interpreting the y-intercept and slope of the line of best fit. *Clarification 3*: Problems include making a prediction or extrapolation, inside and outside the range of the data, based on the equation of the line of fit.
MA.912.DP.4.1:	Describe events as subsets of a sample space using characteristics, or categories, of the outcomes, or as unions, intersections or complements of other events.
MA.912.DP.4.2:	Determine if events A and B are independent by calculating the product of their probabilities.
MA.912.DP.4.3:	Calculate the conditional probability of two events and interpret the result in terms of its context.
MA.912.DP.4.4:	Interpret the independence of two events using conditional probability.
MA.912.DP.4.9:	Apply the addition and multiplication rules for counting to solve mathematical and real-world problems, including problems involving probability.
MA.912.DP.4.10:	Given a mathematical or real-world situation, calculate the appropriate permutation or combination.
MA.912.F.1.1:	Given an equation or graph that defines a function, determine the function type. Given an input-output table, determine a function type that could represent it. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, functions represented as tables are limited to linear, quadratic and exponential. *Clarification 2:* Within the Algebra 1 course, functions represented as equations or graphs are limited to vertical or horizontal translations or reflections over the x-axis of the following parent functions: $f(x)=x$, $f(x)=x^2$, $f(x)=x^3$, $f(x)=\sqrt{x}$, $f(x)=\sqrt[3]{x}$, $f(x)=\|x\|$, $f(x)=2^x$ and $f(x)=\left(\frac{1}{2}\right)^x$.
MA.912.F.1.7:	Compare key features of two functions each represented algebraically, graphically, in tables or written descriptions. **Clarifications:** *Clarification 1*: Key features include domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end

	behavior and asymptotes.
MA.912.F.1.9:	Determine whether a function is even, odd or neither when represented algebraically, graphically or in a table.
MA.912.F.2.2:	Identify the effect on the graph of a given function of two or more transformations defined by adding a real number to the x- or y- values or multiplying the x- or y- values by a real number.
MA.912.F.2.3:	Given the graph or table of f(x) and the graph or table of f(x)+k,kf(x), f(kx) and f(x+k), state the type of transformation and find the value of the real number k. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, functions are limited to linear, quadratic and absolute value.
MA.912.F.2.5:	Given a table, equation or graph that represents a function, create a corresponding table, equation or graph of the transformed function defined by adding a real number to the *x*- or *y*-values or multiplying the *x*- or *y*-values by a real number.
MA.912.F.3.2:	Given a mathematical or real-world context, combine two or more functions, limited to linear, quadratic, exponential and polynomial, using arithmetic operations. When appropriate, include domain restrictions for the new function. **Clarifications:** *Clarification 1*: Instruction includes representing domain restrictions with inequality notation, interval notation or set-builder notation. *Clarification 2*: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.F.3.4:	Represent the composition of two functions algebraically or in a table. Determine the domain and range of the composite function.
MA.912.F.3.6:	Determine whether an inverse function exists by analyzing tables, graphs and equations.
MA.912.F.3.7:	Represent the inverse of a function algebraically, graphically or in a table. Use composition of functions to verify that one function is the inverse of the other. **Clarifications:** *Clarification 1*: Instruction includes the understanding that a logarithmic function is the inverse of an exponential function.
MA.912.FL.3.1:	Compare simple, compound and continuously compounded interest over time. **Clarifications:** *Clarification 1*: Instruction includes taking into consideration the annual percentage rate (APR) when comparing simple and compound interest.
MA.912.FL.3.2:	Solve real-world problems involving simple, compound and continuously compounded interest. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, interest is limited to simple and compound.
MA.912.FL.3.4:	Explain the relationship between simple interest and linear growth. Explain the relationship between compound interest and exponential growth and the relationship between continuously compounded interest and exponential growth. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, exponential growth is limited to compound interest.
MA.912.NSO.1.3:	Generate equivalent algebraic expressions involving radicals or rational exponents using the properties of exponents. **Clarifications:** *Clarification 1*: Within the Algebra 2 course, radicands are limited to monomial algebraic expressions.
MA.912.NSO.1.5:	Add, subtract, multiply and divide algebraic expressions involving radicals. **Clarifications:** *Clarification 1*: Within the Algebra 2 course, radicands are limited to monomial algebraic expressions.
MA.912.NSO.1.6:	Given a numerical logarithmic expression, evaluate and generate equivalent numerical expressions using the properties of logarithms or exponents. **Clarifications:** *Clarification 1*: Within the Mathematics for Data and Financial Literacy Honors course, problem types focus on money and business.
MA.912.NSO.1.7:	Given an algebraic logarithmic expression, generate an equivalent algebraic expression using the properties of logarithms or exponents. **Clarifications:** *Clarification 1*: Within the Mathematics for Data and Financial Literacy Honors course, problem types focus on money and business.
MA.912.NSO.2.1:	Extend previous understanding of the real number system to include the complex number system. Add, subtract, multiply and divide complex numbers.
MA.912.NSO.4.1:	Given a mathematical or real-world context, represent and manipulate data using matrices.
MA.912.NSO.4.2:	Given a mathematical or real-world context, represent and solve a system of two- or three-variable linear equations using matrices.
MA.912.NSO.4.3:	Solve mathematical and real-world problems involving addition, subtraction and multiplication of matrices. **Clarifications:** *Clarification 1:* Instruction includes identifying and using the additive and multiplicative identities for matrices.
MA.912.NSO.4.4:	Solve mathematical and real-world problems using the inverse and determinant of matrices.
MA.K12.MTR.1.1:	Mathematicians who participate in effortful learning both individually and with others: • Analyze the problem in a way that makes sense given the task. • Ask questions that will help with solving the task. • Build perseverance by modifying methods as needed while solving a challenging task. • Stay engaged and maintain a positive mindset when working to solve tasks. • Help and support each other when attempting a new method or approach. **Clarifications:** Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.
	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways:

MA.K12.MTR.2.1:	• Build understanding through modeling and using manipulatives. • Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. • Progress from modeling problems with objects and drawings to using algorithms and equations. • Express connections between concepts and representations. • Choose a representation based on the given context or purpose. **Clarifications:** Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations. **Clarifications:** Teachers who encourage students to complete tasks with mathematical fluency: • Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. • Offer multiple opportunities for students to practice efficient and generalizable methods. • Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: • Communicate mathematical ideas, vocabulary and methods effectively. • Analyze the mathematical thinking of others. • Compare the efficiency of a method to those expressed by others. • Recognize errors and suggest how to correctly solve the task. • Justify results by explaining methods and processes. • Construct possible arguments based on evidence. **Clarifications:** Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. **Clarifications:** Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. **Clarifications:** Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
	Apply mathematics to real-world contexts.

MA.K12.MTR.7.1:	Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems. • Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. **Clarifications:** Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. **Clarifications:** K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. **Clarifications:** See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. **Clarifications:** Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. **Clarifications:** In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think _______ because ______." The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. **Clarifications:** Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. **Clarifications:** In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

General Course Information and Notes

VERSION DESCRIPTION

In Algebra 2 Honors, instructional time will emphasize six areas: (1) developing understanding of the complex number system, including complex numbers as roots of polynomial equations; (2) extending arithmetic operations with algebraic expressions to include polynomial division, radical and rational expressions; (3) graphing and analyzing functions including polynomials, absolute value, radical, rational, exponential and logarithmic; (4) extending systems of equations and inequalities to include non-linear expressions; (5)building functions using compositions, inverses and transformations and (6) developing understanding of probability concepts.

All clarifications stated, whether general or specific to Algebra 2 Honors, are expectations for instruction of that benchmark.

Curricular content for all subjects must integrate critical-thinking, problem-solving, and workforce-literacy skills; communication, reading, and writing skills; mathematics skills; collaboration skills; contextual and applied-learning skills; technology-literacy skills; information and media-literacy skills; and civic-engagement skills.

GENERAL NOTES

Honors and Accelerated Level Course Note: Accelerated courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards
This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Number: 1200340

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Algebra >

Abbreviated Title: ALG 2 H

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- Honors
- Class Size Core Required

Course Type: Core Academic Course

Course Level: 3

Course Status: State Board Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Mathematics

Educator Certifications

Mathematics (Grades 6-12)

Algebra 1-A (#1200370) 2015 - 2022 (current)

Course Standards

Name	Description
MAFS.912.A-CED.1.1:	Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational, absolute, and exponential functions. ★
MAFS.912.A-CED.1.2:	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. ★
MAFS.912.A-CED.1.3:	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.* ★
MAFS.912.A-CED.1.4:	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law V = IR to highlight resistance R.* ★
MAFS.912.A-REI.1.1:	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
MAFS.912.A-REI.2.3:	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
MAFS.912.A-REI.3.5:	Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.
MAFS.912.A-REI.3.6:	Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
MAFS.912.A-REI.4.10:	Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).
MAFS.912.A-REI.4.11:	Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. ★
MAFS.912.A-REI.4.12:	Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.
MAFS.912.A-SSE.1.1:	Interpret expressions that represent a quantity in terms of its context. ★ a. Interpret parts of an expression, such as terms, factors, and coefficients. b. Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret as the product of P and a factor not depending on P.*
MAFS.912.F-BF.1.1:	Write a function that describes a relationship between two quantities. ★ a. Determine an explicit expression, a recursive process, or steps for calculation from a context. b. Combine standard function types using arithmetic operations. *For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.* c. Compose functions. *For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time.*
MAFS.912.F-BF.2.3:	Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. *Include recognizing even and odd functions from their graphs and algebraic expressions for them.*
MAFS.912.F-IF.1.1:	Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input x. The graph of f is the graph of the equation y = f(x).
MAFS.912.F-IF.1.2:	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
MAFS.912.F-IF.1.3:	Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by f(0) = f(1) = 1, f(n+1) = f(n) + f(n-1) for n ≥ 1.
MAFS.912.F-IF.2.4:	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.* ★
MAFS.912.F-IF.2.5:	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble engines in a factory, then the positive integers would be an appropriate domain for the function.* ★
MAFS.912.F-IF.2.6:	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. ★
MAFS.912.F-IF.3.7:	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★ a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift.

MAFS.912.F-IF.3.9:	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.*
MAFS.912.F-LE.1.1:	Distinguish between situations that can be modeled with linear functions and with exponential functions. ★ a. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
MAFS.912.F-LE.1.2:	Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table). ★
MAFS.912.F-LE.1.3:	Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function. ★
MAFS.912.F-LE.2.5:	Interpret the parameters in a linear or exponential function in terms of a context. ★
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★
MAFS.912.N-Q.1.2:	Define appropriate quantities for the purpose of descriptive modeling. ★ **Clarifications:** **Algebra 1 Content Notes:** Working with quantities and the relationships between them provides grounding for work with expressions, equations, and functions.
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★
MAFS.912.N-RN.1.1:	Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. *For example, we define* $5^{1/3}$ *to be the cube root of 5 because we want* $(5^{1/3})^3 = 5^{(1/3)3}$ *to hold, so* $(5^{1/3})^3$ *must equal 5.*
MAFS.912.N-RN.1.2:	Rewrite expressions involving radicals and rational exponents using the properties of exponents.
MAFS.K12.MP.1.1:	**Make sense of problems and persevere in solving them.** Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
MAFS.K12.MP.2.1:	**Reason abstractly and quantitatively**. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
MAFS.K12.MP.3.1:	**Construct viable arguments and critique the reasoning of others.** Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
MAFS.K12.MP.4.1:	**Model with mathematics.** Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
MAFS.K12.MP.5.1:	**Use appropriate tools strategically.** Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze

	graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
MAFS.K12.MP.6.1:	**Attend to precision.** Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
MAFS.K12.MP.7.1:	**Look for and make use of structure.** Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
MAFS.K12.MP.8.1:	**Look for and express regularity in repeated reasoning.** Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
LAFS.910.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
LAFS.910.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.
LAFS.910.RST.3.7:	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LAFS.910.SL.1.1:	Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed. c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions. d. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.
LAFS.910.SL.1.2:	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
LAFS.910.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.
LAFS.910.SL.2.4:	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
LAFS.910.WHST.1.1:	Write arguments focused on *discipline-specific content.* a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns. c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.910.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.910.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

VERSION DESCRIPTION

The fundamental purpose of this course is to formalize and extend the mathematics that students learned in the middle grades. The critical areas, called units, deepen and extend understanding of linear and exponential relationships by contrasting them with each other and by applying linear models to data that exhibit a linear trend, and students engage in methods for analyzing, solving, and using quadratic functions. The Standards for Mathematical Practice apply throughout each course and, together with the content standards, prescribe that students experience mathematics as a coherent, useful, and logical subject that makes use of their ability to make sense of problem situations.

Algebra 1A (Year 1)

Unit 1- Relationships Between Quantities and Reasoning with Equations: By the end of eighth grade, students have learned to solve linear equations in one variable and have applied graphical and algebraic methods to analyze and solve systems of linear equations in two variables. Now, students analyze and explain the process of solving an equation. Students develop fluency writing, interpreting, and translating between various forms of linear equations and inequalities, and using them to solve problems. They master the solution of linear equations and apply related solution techniques and the laws of exponents to the creation and solution of simple exponential equations.

Unit 2- Linear and Exponential Relationships: In earlier grades, students define, evaluate, and compare functions, and use them to model relationships between quantities. In this unit, students will learn function notation and develop the concepts of domain and range. They explore many examples of functions, including sequences; they interpret functions given graphically, numerically, symbolically, and verbally, translate between representations, and understand the limitations of various representations. Students build on and informally extend their understanding of integer exponents to consider exponential functions. They compare and contrast linear and exponential functions, distinguishing between additive and multiplicative change. Students explore systems of equations and inequalities, and they find and interpret their solutions. They interpret arithmetic sequences as linear functions and geometric sequences as exponential functions.

Algebra 1B (Year 2)

Unit 3- Descriptive Statistics: This unit builds upon students' prior experiences with data, providing students with more formal means of assessing how a model fits data. Students use regression techniques to describe and approximate linear relationships between quantities. They use graphical representations and knowledge of the context to make judgments about the appropriateness of linear models. With linear models, they look at residuals to analyze the goodness of fit.

Unit 4- Expressions and Equations: In this unit, students build on their knowledge from unit 2, where they extended the laws of exponents to rational exponents. Students apply this new understanding of number and strengthen their ability to see structure in and create quadratic and exponential expressions. They create and solve equations, inequalities, and systems of equations involving quadratic expressions.

Unit 5- Quadratic Functions and Modeling: In this unit, students consider quadratic functions, comparing the key characteristics of quadratic functions to those of linear and exponential functions. They select from among these functions to model phenomena. Students learn to anticipate the graph of a quadratic function by interpreting various forms of quadratic expressions. In particular, they identify the real solutions of a quadratic equation as the zeros of a related quadratic function. Students expand their experience with functions to include more specialized functions, absolute value, step, and those that are piecewise-defined.

GENERAL NOTES

Fluency Recommendations

A/G- Algebra I students become fluent in solving characteristic problems involving the analytic geometry of lines, such as writing down the equation of a line given a point and a slope. Such fluency can support them in solving less routine mathematical problems involving linearity, as well as in modeling linear phenomena (including modeling using systems of linear inequalities in two variables).

A-APR.1- Fluency in adding, subtracting, and multiplying polynomials supports students throughout their work in Algebra, as well as in their symbolic work with functions. Manipulation can be more mindful when it is fluent.

A-SSE.1b- Fluency in transforming expressions and chunking (seeing parts of an expression as a single object) is essential in factoring, completing the square, and other mindful algebraic calculations.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

Additional Instructional Resources:
A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGI/cms/review.html?Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

Course Number: 1200370

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Algebra >
Abbreviated Title: ALG 1-A

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- Class Size Core Required

Course Type: Core Academic Course

Course Level: 2

Course Status: Course Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Mathematics

Educator Certifications

Mathematics (Grades 6-12)
Middle Grades Mathematics (Middle Grades 5-9)

Algebra 1-A (#1200370) 2022 - And Beyond

Course Standards

Name	Description
MA.912.AR.1.1:	Identify and interpret parts of an equation or expression that represent a quantity in terms of a mathematical or real-world context, including viewing one or more of its parts as a single entity. **Clarifications:** *Clarification 1:* Parts of an expression include factors, terms, constants, coefficients and variables. *Clarification 2:* Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.1.2:	Rearrange equations or formulas to isolate a quantity of interest. **Clarifications:** *Clarification 1*: Instruction includes using formulas for temperature, perimeter, area and volume; using equations for linear (standard, slope-intercept and point-slope forms) and quadratic (standard, factored and vertex forms) functions. *Clarification 2*: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.2.1:	Given a real-world context, write and solve one-variable multi-step linear equations.
MA.912.AR.2.2:	Write a linear two-variable equation to represent the relationship between two quantities from a graph, a written description or a table of values within a mathematical or real-world context. **Clarifications:** *Clarification 1:* Instruction includes the use of standard form, slope-intercept form and point-slope form, and the conversion between these forms.
MA.912.AR.2.3:	Write a linear two-variable equation for a line that is parallel or perpendicular to a given line and goes through a given point. **Clarifications:** *Clarification 1:* Instruction focuses on recognizing that perpendicular lines have slopes that when multiplied result in -1 and that parallel lines have slopes that are the same. *Clarification 2:* Instruction includes representing a line with a pair of points on the coordinate plane or with an equation. *Clarification 3:* Problems include cases where one variable has a coefficient of zero.
MA.912.AR.2.4:	Given a table, equation or written description of a linear function, graph that function, and determine and interpret its key features. **Clarifications:** *Clarification 1*: Key features are limited to domain, range, intercepts and rate of change. *Clarification 2*: Instruction includes the use of standard form, slope-intercept form and point-slope form. *Clarification 3*: Instruction includes cases where one variable has a coefficient of zero. *Clarification 4*: Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation. *Clarification 5*: Within the Algebra 1 course, notations for domain and range are limited to inequality and set-builder notations.
MA.912.AR.2.5:	Solve and graph mathematical and real-world problems that are modeled with linear functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain, range, intercepts and rate of change. *Clarification 2*: Instruction includes the use of standard form, slope-intercept form and point-slope form. *Clarification 3*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation. *Clarification 4*: Within the Algebra 1 course, notations for domain, range and constraints are limited to inequality and set-builder. *Clarification 5*: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.2.6:	Given a mathematical or real-world context, write and solve one-variable linear inequalities, including compound inequalities. Represent solutions algebraically or graphically.
MA.912.AR.2.7:	Write two-variable linear inequalities to represent relationships between quantities from a graph or a written description within a mathematical or real-world context. **Clarifications:** *Clarification 1:* Instruction includes the use of standard form, slope-intercept form and point-slope form and any inequality symbol can be represented. *Clarification 2:* Instruction includes cases where one variable has a coefficient of zero.
MA.912.AR.2.8:	Given a mathematical or real-world context, graph the solution set to a two-variable linear inequality. **Clarifications:** *Clarification 1:* Instruction includes the use of standard form, slope-intercept form and point-slope form and any inequality symbol can be represented. *Clarification 2:* Instruction includes cases where one variable has a coefficient of zero.

MA.912.AR.4.1:	Given a mathematical or real-world context, write and solve one-variable absolute value equations.
MA.912.AR.4.3:	Given a table, equation or written description of an absolute value function, graph that function and determine its key features. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; vertex; end behavior and symmetry. *Clarification 2*: Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation. *Clarification 3*: Within the Algebra 1 course, notations for domain and range are limited to inequality and set-builder.
MA.912.AR.9.1:	Given a mathematical or real-world context, write and solve a system of two-variable linear equations algebraically or graphically. **Clarifications:** *Clarification 1*: Within this benchmark, the expectation is to solve systems using elimination, substitution and graphing. *Clarification 2*: Within the Algebra 1 course, the system is limited to two equations.
MA.912.AR.9.4:	Graph the solution set of a system of two-variable linear inequalities. **Clarifications:** *Clarification 1:* Instruction includes cases where one variable has a coefficient of zero. *Clarification 2:* Within the Algebra 1 course, the system is limited to two inequalities.
MA.912.AR.9.6:	Given a real-world context, represent constraints as systems of linear equations or inequalities. Interpret solutions to problems as viable or non-viable options. **Clarifications:** *Clarification 1*: Instruction focuses on analyzing a given function that models a real-world situation and writing constraints that are represented as linear equations or linear inequalities.
MA.912.DP.1.3:	Explain the difference between correlation and causation in the contexts of both numerical and categorical data.
MA.912.DP.2.4:	Fit a linear function to bivariate numerical data that suggests a linear association and interpret the slope and y-intercept of the model. Use the model to solve real-world problems in terms of the context of the data. **Clarifications:** *Clarification 1*: Instruction includes fitting a linear function both informally and formally with the use of technology. *Clarification 2*: Problems include making a prediction or extrapolation, inside and outside the range of the data, based on the equation of the line of fit.
MA.912.DP.2.6:	Given a scatter plot with a line of fit and residuals, determine the strength and direction of the correlation. Interpret strength and direction within a real-world context. **Clarifications:** *Clarification 1*: Instruction focuses on determining the direction by analyzing the slope and informally determining the strength by analyzing the residuals.
MA.912.F.1.1:	Given an equation or graph that defines a function, determine the function type. Given an input-output table, determine a function type that could represent it. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, functions represented as tables are limited to linear, quadratic and exponential. *Clarification 2:* Within the Algebra 1 course, functions represented as equations or graphs are limited to vertical or horizontal translations or reflections over the x-axis of the following parent functions: $f(x)=x$, $f(x)=x^2$, $f(x)=x^3$, $f(x)=\sqrt{x}$, $f(x)=\sqrt[3]{x}$, $f(x)=\lvert x\rvert$, $f(x)=2^x$ and $f(x)=\left(\frac{1}{2}\right)^x$.
MA.912.F.1.2:	Given a function represented in function notation, evaluate the function for an input in its domain. For a real-world context, interpret the output. **Clarifications:** *Clarification 1*: Problems include simple functions in two-variables, such as f(x,y)=3x-2y. *Clarification 2*: Within the Algebra 1 course, functions are limited to one-variable such as f(x)=3x.
MA.912.F.1.3:	Calculate and interpret the average rate of change of a real-world situation represented graphically, algebraically or in a table over a specified interval. **Clarifications:** *Clarification 1*: Instruction includes making the connection to determining the slope of a particular line segment.
MA.912.F.1.5:	Compare key features of linear functions each represented algebraically, graphically, in tables or written descriptions. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; slope and end behavior.
MA.912.F.1.8:	Determine whether a linear, quadratic or exponential function best models a given real-world situation. **Clarifications:** *Clarification 1*: Instruction includes recognizing that linear functions model situations in which a quantity changes by a constant amount per unit interval; that quadratic functions model situations in which a quantity increases to a maximum, then begins to decrease or a quantity decreases to a minimum, then begins to increase; and that exponential functions model situations in which a quantity grows or decays by a constant percent per unit interval. *Clarification 2*: Within this benchmark, the expectation is to identify the type of function from a written description or table.
MA.912.F.2.1:	Identify the effect on the graph or table of a given function after replacing *f(x)* by *f(x)+k*,*kf(x)*, *f(kx)* and *f(x+k)* for specific values of *k*. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, functions are limited to linear, quadratic and absolute value. *Clarification 2*: Instruction focuses on including positive and negative values for *k*.

MA.912.FL.3.2:	Solve real-world problems involving simple, compound and continuously compounded interest. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, interest is limited to simple and compound.
MA.912.FL.3.4:	Explain the relationship between simple interest and linear growth. Explain the relationship between compound interest and exponential growth and the relationship between continuously compounded interest and exponential growth. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, exponential growth is limited to compound interest.
MA.K12.MTR.1.1:	Mathematicians who participate in effortful learning both individually and with others: • Analyze the problem in a way that makes sense given the task. • Ask questions that will help with solving the task. • Build perseverance by modifying methods as needed while solving a challenging task. • Stay engaged and maintain a positive mindset when working to solve tasks. • Help and support each other when attempting a new method or approach. **Clarifications:** Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: • Build understanding through modeling and using manipulatives. • Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. • Progress from modeling problems with objects and drawings to using algorithms and equations. • Express connections between concepts and representations. • Choose a representation based on the given context or purpose. **Clarifications:** Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations. **Clarifications:** Teachers who encourage students to complete tasks with mathematical fluency: • Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. • Offer multiple opportunities for students to practice efficient and generalizable methods. • Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: • Communicate mathematical ideas, vocabulary and methods effectively. • Analyze the mathematical thinking of others. • Compare the efficiency of a method to those expressed by others. • Recognize errors and suggest how to correctly solve the task. • Justify results by explaining methods and processes. • Construct possible arguments based on evidence. **Clarifications:** Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers.
	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts.

MA.K12.MTR.5.1:	• Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. **Clarifications:** Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. **Clarifications:** Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems. • Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. **Clarifications:** Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. **Clarifications:** K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. **Clarifications:** See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. **Clarifications:** Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. **Clarifications:** In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think _______ because ______." The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. **Clarifications:** Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.

ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. **Clarifications:** In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

General Course Information and Notes

VERSION DESCRIPTION

In Algebra 1-A, instructional time will emphasize four areas: (1) extending understanding of functions to linear functions and using them to model and analyze real-world relationships; (2) solving linear equations and inequalities in one variable and systems of linear equations and inequalities in two variables; (3) building linear functions, identifying their key features and representing them in various ways and (4) representing and interpreting categorical and numerical data with one and two variables.

All clarifications stated, whether general or specific to Algebra I-A, are expectations for instruction of that benchmark. Please note that all clarifications that address Algebra 1 also should be addressed within Algebra 1-A.

Curricular content for all subjects must integrate critical-thinking, problem-solving, and workforce-literacy skills; communication, reading, and writing skills; mathematics skills; collaboration skills; contextual and applied-learning skills; technology-literacy skills; information and media-literacy skills; and civic-engagement skills.

GENERAL NOTES

Florida’s Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards
This course includes Florida’s B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL’s need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Number: 1200370

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Algebra >

Abbreviated Title: ALG 1-A

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- Class Size Core Required

Course Type: Core Academic Course

Course Level: 2

Course Status: State Board Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Mathematics

Educator Certifications

Mathematics (Grades 6-12)
Middle Grades Mathematics (Middle Grades 5-9)

Algebra 1-A for Credit Recovery (#1200375) 2015 - 2022 (current)

Course Standards

Name	Description
MAFS.912.A-CED.1.1:	Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational, absolute, and exponential functions. ★
MAFS.912.A-CED.1.2:	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. ★
MAFS.912.A-CED.1.3:	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.* ★
MAFS.912.A-CED.1.4:	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law V = IR to highlight resistance R.* ★
MAFS.912.A-REI.1.1:	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
MAFS.912.A-REI.2.3:	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
MAFS.912.A-REI.3.5:	Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.
MAFS.912.A-REI.3.6:	Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
MAFS.912.A-REI.4.10:	Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).
MAFS.912.A-REI.4.11:	Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. ★
MAFS.912.A-REI.4.12:	Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.
MAFS.912.A-SSE.1.1:	Interpret expressions that represent a quantity in terms of its context. ★ a. Interpret parts of an expression, such as terms, factors, and coefficients. b. Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret as the product of P and a factor not depending on P.*
MAFS.912.F-BF.1.1:	Write a function that describes a relationship between two quantities. ★ a. Determine an explicit expression, a recursive process, or steps for calculation from a context. b. Combine standard function types using arithmetic operations. *For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.* c. Compose functions. *For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time.*
MAFS.912.F-BF.2.3:	Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. *Include recognizing even and odd functions from their graphs and algebraic expressions for them.*
MAFS.912.F-IF.1.1:	Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input x. The graph of f is the graph of the equation y = f(x).
MAFS.912.F-IF.1.2:	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
MAFS.912.F-IF.1.3:	Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by f(0) = f(1) = 1, f(n+1) = f(n) + f(n-1) for n ≥ 1.
MAFS.912.F-IF.2.4:	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.* ★
MAFS.912.F-IF.2.5:	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble engines in a factory, then the positive integers would be an appropriate domain for the function.* ★
MAFS.912.F-IF.2.6:	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. ★
MAFS.912.F-IF.3.7:	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★ a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift.

MAFS.912.F-IF.3.9:	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.*
MAFS.912.F-LE.1.1:	Distinguish between situations that can be modeled with linear functions and with exponential functions. ★ a. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
MAFS.912.F-LE.1.2:	Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table). ★
MAFS.912.F-LE.1.3:	Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function. ★
MAFS.912.F-LE.2.5:	Interpret the parameters in a linear or exponential function in terms of a context. ★
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★
MAFS.912.N-Q.1.2:	Define appropriate quantities for the purpose of descriptive modeling. ★ **Clarifications:** **Algebra 1 Content Notes:** Working with quantities and the relationships between them provides grounding for work with expressions, equations, and functions.
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★
MAFS.912.N-RN.1.1:	Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. *For example, we define* $5^{1/3}$ *to be the cube root of 5 because we want* $(5^{1/3})^3 = 5^{(1/3)3}$ *to hold, so* $(5^{1/3})^3$ *must equal 5.*
MAFS.912.N-RN.1.2:	Rewrite expressions involving radicals and rational exponents using the properties of exponents.
MAFS.K12.MP.1.1:	**Make sense of problems and persevere in solving them.** Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
MAFS.K12.MP.2.1:	**Reason abstractly and quantitatively**. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
MAFS.K12.MP.3.1:	**Construct viable arguments and critique the reasoning of others.** Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
MAFS.K12.MP.4.1:	**Model with mathematics.** Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
MAFS.K12.MP.5.1:	**Use appropriate tools strategically.** Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze

	graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
MAFS.K12.MP.6.1:	**Attend to precision.** Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
MAFS.K12.MP.7.1:	**Look for and make use of structure.** Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
MAFS.K12.MP.8.1:	**Look for and express regularity in repeated reasoning.** Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
LAFS.910.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
LAFS.910.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.
LAFS.910.RST.3.7:	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LAFS.910.SL.1.1:	Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed. c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions. d. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.
LAFS.910.SL.1.2:	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
LAFS.910.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.
LAFS.910.SL.2.4:	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
LAFS.910.WHST.1.1:	Write arguments focused on *discipline-specific content.* a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns. c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.910.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.910.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

VERSION DESCRIPTION

Special notes: Credit Recovery courses are credit bearing courses with specific content requirements defined by Next Generation Sunshine State Standards and/or Florida Standards. Students enrolled in a Credit Recovery course must have previously attempted the corresponding course (and/or End-of-Course assessment) since the course requirements for the Credit Recovery course are exactly the same as the previously attempted corresponding course. For example, Geometry (1206310) and Geometry for Credit Recovery (1206315) have identical content requirements. It is important to note that Credit Recovery courses are not bound by Section 1003.436(1)(a), Florida Statutes, requiring a minimum of 135 hours of bona fide instruction (120 hours in a school/district implementing block scheduling) in a designed course of study that contains student performance standards, since the students have previously attempted successful completion of the corresponding course. Additionally, Credit Recovery courses should ONLY be used for credit recovery, grade forgiveness, or remediation for students needing to prepare for an End-of-Course assessment retake.

GENERAL NOTES

The fundamental purpose of this course is to formalize and extend the mathematics that students learned in the middle grades. The critical areas, called units, deepen and extend understanding of linear and exponential relationships by contrasting them with each other and by applying linear models to data that exhibit a linear trend, and students engage in methods for analyzing, solving, and using quadratic functions. The Standards for Mathematical Practice apply throughout each course and, together with the content standards, prescribe that students experience mathematics as a coherent, useful, and logical subject that makes use of their ability to make sense of problem situations.

Algebra 1A (Year 1)

Unit 1-Relationships Between Questions and Reasoning with Equations: By the end of eighth grade, students have learned to solve linear equations in one variable and have applied graphical and algebraic methods to analyze and solve systems of linear equations in two variables. Now, students analyze and explain the process of solving an equation. Students develop fluency writing, interpreting, and translating between various forms of linear equations and inequalities, and using them to solve problems. They master the solution of linear equations and apply related solution techniques and the laws of exponents to the creation and solution of simple exponential equations.

Unit 2- Linear and Exponential Relationships: In earlier grades, students define, evaluate, and compare functions, and use them to model relationships between quantities. In this unit, students will learn function notation and develop the concepts of domain and range. They explore many examples of functions, including sequences; they interpret functions given graphically, numerically, symbolically, and verbally, translate between representations, and understand the limitations of various representations. Students build on and informally extend their understanding of integer exponents to consider exponential functions. They compare and contrast linear and exponential functions, distinguishing between additive and multiplicative change. Students explore systems of equations and inequalities, and they find and interpret their solutions. They interpret arithmetic sequences as linear functions and geometric sequences as exponential functions.

Algebra 1B (Year 2)

Unit 3- Descriptive Statistics: This unit builds upon students' prior experiences with data, providing students with more formal means of assessing how a model fits data. Students use regression techniques to describe and approximate linear relationships between quantities. They use graphical representations and knowledge of the context to make judgments about the appropriateness of linear models. With linear models, they look at residuals to analyze the goodness of fit.

Unit 4- Expressions and Equations: In this unit, students build on their knowledge from unit 2, where they extended the laws of exponents to rational exponents. Students apply this new understanding of number and strengthen their ability to see structure in and create quadratic and exponential expressions. They create and solve equations, inequalities, and systems of equations involving quadratic expressions.

Unit 5- Quadratic Functions and Modeling: In this unit, students consider quadratic functions, comparing the key characteristics of quadratic functions to those of linear and exponential functions. They select from among these functions to model phenomena. Students learn to anticipate the graph of a quadratic function by interpreting various forms of quadratic expressions. In particular, they identify the real solutions of a quadratic equation as the zeros of a related quadratic function. Students expand their experience with functions to include more specialized functions—absolute value, step, and those that are piecewise-defined.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:
https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

VERSION REQUIREMENTS

Fluency Recommendations

A/G- Algebra I students become fluent in solving characteristic problems involving the analytic geometry of lines, such as writing down the equation of a line given a point and a slope. Such fluency can support them in solving less routine mathematical problems involving linearity, as well as in modeling linear phenomena (including modeling using systems of linear inequalities in two variables).

A-APR.1- Fluency in adding, subtracting, and multiplying polynomials supports students throughout their work in Algebra, as well as in their symbolic work with functions. Manipulation can be more mindful when it is fluent.

A-SSE.1b- Fluency in transforming expressions and chunking (seeing parts of an expression as a single object) is essential in factoring, completing the square, and other mindful algebraic calculations.

GENERAL INFORMATION

Course Number: 1200375

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Algebra >

Abbreviated Title: ALG 1-A CR

Number of Credits: One (1) credit

Course Length: Credit Recovery (R)

Course Type: Elective Course

Course Level: 2

Course Status: Course Approved

Grade Level(s): 9,10,11,12

Educator Certifications

Mathematics (Grades 6-12)
Middle Grades Mathematics (Middle Grades 5-9)

Algebra 1-A for Credit Recovery (#1200375) 2022 - And Beyond

Course Standards

Name	Description
MA.912.AR.1.1:	Identify and interpret parts of an equation or expression that represent a quantity in terms of a mathematical or real-world context, including viewing one or more of its parts as a single entity. **Clarifications:** *Clarification 1:* Parts of an expression include factors, terms, constants, coefficients and variables. *Clarification 2:* Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.1.2:	Rearrange equations or formulas to isolate a quantity of interest. **Clarifications:** *Clarification 1*: Instruction includes using formulas for temperature, perimeter, area and volume; using equations for linear (standard, slope-intercept and point-slope forms) and quadratic (standard, factored and vertex forms) functions. *Clarification 2*: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.2.1:	Given a real-world context, write and solve one-variable multi-step linear equations.
MA.912.AR.2.2:	Write a linear two-variable equation to represent the relationship between two quantities from a graph, a written description or a table of values within a mathematical or real-world context. **Clarifications:** *Clarification 1:* Instruction includes the use of standard form, slope-intercept form and point-slope form, and the conversion between these forms.
MA.912.AR.2.3:	Write a linear two-variable equation for a line that is parallel or perpendicular to a given line and goes through a given point. **Clarifications:** *Clarification 1:* Instruction focuses on recognizing that perpendicular lines have slopes that when multiplied result in -1 and that parallel lines have slopes that are the same. *Clarification 2:* Instruction includes representing a line with a pair of points on the coordinate plane or with an equation. *Clarification 3:* Problems include cases where one variable has a coefficient of zero.
MA.912.AR.2.4:	Given a table, equation or written description of a linear function, graph that function, and determine and interpret its key features. **Clarifications:** *Clarification 1*: Key features are limited to domain, range, intercepts and rate of change. *Clarification 2*: Instruction includes the use of standard form, slope-intercept form and point-slope form. *Clarification 3*: Instruction includes cases where one variable has a coefficient of zero. *Clarification 4*: Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation. *Clarification 5*: Within the Algebra 1 course, notations for domain and range are limited to inequality and set-builder notations.
MA.912.AR.2.5:	Solve and graph mathematical and real-world problems that are modeled with linear functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain, range, intercepts and rate of change. *Clarification 2*: Instruction includes the use of standard form, slope-intercept form and point-slope form. *Clarification 3*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation. *Clarification 4*: Within the Algebra 1 course, notations for domain, range and constraints are limited to inequality and set-builder. *Clarification 5*: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.2.6:	Given a mathematical or real-world context, write and solve one-variable linear inequalities, including compound inequalities. Represent solutions algebraically or graphically.
MA.912.AR.2.7:	Write two-variable linear inequalities to represent relationships between quantities from a graph or a written description within a mathematical or real-world context. **Clarifications:** *Clarification 1:* Instruction includes the use of standard form, slope-intercept form and point-slope form and any inequality symbol can be represented. *Clarification 2:* Instruction includes cases where one variable has a coefficient of zero.
MA.912.AR.2.8:	Given a mathematical or real-world context, graph the solution set to a two-variable linear inequality. **Clarifications:** *Clarification 1:* Instruction includes the use of standard form, slope-intercept form and point-slope form and any inequality symbol can be represented. *Clarification 2:* Instruction includes cases where one variable has a coefficient of zero.
MA.912.AR.4.1:	Given a mathematical or real-world context, write and solve one-variable absolute value equations.

MA.912.AR.4.3:	Given a table, equation or written description of an absolute value function, graph that function and determine its key features. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; vertex; end behavior and symmetry. *Clarification 2*: Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation. *Clarification 3*: Within the Algebra 1 course, notations for domain and range are limited to inequality and set-builder.
MA.912.AR.9.1:	Given a mathematical or real-world context, write and solve a system of two-variable linear equations algebraically or graphically. **Clarifications:** *Clarification 1*: Within this benchmark, the expectation is to solve systems using elimination, substitution and graphing. *Clarification 2*: Within the Algebra 1 course, the system is limited to two equations.
MA.912.AR.9.4:	Graph the solution set of a system of two-variable linear inequalities. **Clarifications:** *Clarification 1:* Instruction includes cases where one variable has a coefficient of zero. *Clarification 2:* Within the Algebra 1 course, the system is limited to two inequalities.
MA.912.AR.9.6:	Given a real-world context, represent constraints as systems of linear equations or inequalities. Interpret solutions to problems as viable or non-viable options. **Clarifications:** *Clarification 1*: Instruction focuses on analyzing a given function that models a real-world situation and writing constraints that are represented as linear equations or linear inequalities.
MA.912.DP.1.3:	Explain the difference between correlation and causation in the contexts of both numerical and categorical data.
MA.912.DP.2.4:	Fit a linear function to bivariate numerical data that suggests a linear association and interpret the slope and y-intercept of the model. Use the model to solve real-world problems in terms of the context of the data. **Clarifications:** *Clarification 1*: Instruction includes fitting a linear function both informally and formally with the use of technology. *Clarification 2*: Problems include making a prediction or extrapolation, inside and outside the range of the data, based on the equation of the line of fit.
MA.912.DP.2.6:	Given a scatter plot with a line of fit and residuals, determine the strength and direction of the correlation. Interpret strength and direction within a real-world context. **Clarifications:** *Clarification 1*: Instruction focuses on determining the direction by analyzing the slope and informally determining the strength by analyzing the residuals.
MA.912.F.1.1:	Given an equation or graph that defines a function, determine the function type. Given an input-output table, determine a function type that could represent it. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, functions represented as tables are limited to linear, quadratic and exponential. *Clarification 2:* Within the Algebra 1 course, functions represented as equations or graphs are limited to vertical or horizontal translations or reflections over the x-axis of the following parent functions: $f(x)=x$, $f(x)=x^2$, $f(x)=x^3$, $f(x)=\sqrt{x}$, $f(x)=\sqrt[3]{x}$, $f(x)=\lvert x\rvert$, $f(x)=2^x$ and $f(x)=\left(\frac{1}{2}\right)^x$.
MA.912.F.1.2:	Given a function represented in function notation, evaluate the function for an input in its domain. For a real-world context, interpret the output. **Clarifications:** *Clarification 1*: Problems include simple functions in two-variables, such as f(x,y)=3x-2y. *Clarification 2*: Within the Algebra 1 course, functions are limited to one-variable such as f(x)=3x.
MA.912.F.1.3:	Calculate and interpret the average rate of change of a real-world situation represented graphically, algebraically or in a table over a specified interval. **Clarifications:** *Clarification 1*: Instruction includes making the connection to determining the slope of a particular line segment.
MA.912.F.1.5:	Compare key features of linear functions each represented algebraically, graphically, in tables or written descriptions. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; slope and end behavior.
MA.912.F.1.8:	Determine whether a linear, quadratic or exponential function best models a given real-world situation. **Clarifications:** *Clarification 1*: Instruction includes recognizing that linear functions model situations in which a quantity changes by a constant amount per unit interval; that quadratic functions model situations in which a quantity increases to a maximum, then begins to decrease or a quantity decreases to a minimum, then begins to increase; and that exponential functions model situations in which a quantity grows or decays by a constant percent per unit interval. *Clarification 2*: Within this benchmark, the expectation is to identify the type of function from a written description or table.
MA.912.F.2.1:	Identify the effect on the graph or table of a given function after replacing *f(x)* by *f(x)+k*,*kf(x)*, *f(kx)* and *f(x+k)* for specific values of *k*. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, functions are limited to linear, quadratic and absolute value. *Clarification 2*: Instruction focuses on including positive and negative values for *k*.
	Solve real-world problems involving simple, compound and continuously compounded interest.

MA.912.FL.3.2:	**Clarifications:** *Clarification 1*: Within the Algebra 1 course, interest is limited to simple and compound.
MA.912.FL.3.4:	Explain the relationship between simple interest and linear growth. Explain the relationship between compound interest and exponential growth and the relationship between continuously compounded interest and exponential growth. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, exponential growth is limited to compound interest.
MA.K12.MTR.1.1:	Mathematicians who participate in effortful learning both individually and with others: • Analyze the problem in a way that makes sense given the task. • Ask questions that will help with solving the task. • Build perseverance by modifying methods as needed while solving a challenging task. • Stay engaged and maintain a positive mindset when working to solve tasks. • Help and support each other when attempting a new method or approach. **Clarifications:** Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: • Build understanding through modeling and using manipulatives. • Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. • Progress from modeling problems with objects and drawings to using algorithms and equations. • Express connections between concepts and representations. • Choose a representation based on the given context or purpose. **Clarifications:** Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations. **Clarifications:** Teachers who encourage students to complete tasks with mathematical fluency: • Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. • Offer multiple opportunities for students to practice efficient and generalizable methods. • Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: • Communicate mathematical ideas, vocabulary and methods effectively. • Analyze the mathematical thinking of others. • Compare the efficiency of a method to those expressed by others. • Recognize errors and suggest how to correctly solve the task. • Justify results by explaining methods and processes. • Construct possible arguments based on evidence. **Clarifications:** Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations.

	Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. **Clarifications:** Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems. • Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. **Clarifications:** Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. **Clarifications:** K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. **Clarifications:** See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. **Clarifications:** Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. **Clarifications:** In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think _______ because ______." The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. **Clarifications:** Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.

ELA.K12.EE.6.1:	**Clarifications:** In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

General Course Information and Notes

VERSION DESCRIPTION

In Algebra 1-A, instructional time will emphasize four areas: (1) extending understanding of functions to linear functions and using them to model and analyze real-world relationships; (2) solving linear equations and inequalities in one variable and systems of linear equations and inequalities in two variables; (3) building linear functions, identifying their key features and representing them in various ways and (4) representing and interpreting categorical and numerical data with one and two variables.

All clarifications stated, whether general or specific to Algebra I-A, are expectations for instruction of that benchmark. Please note that all clarifications that address Algebra 1 also should be addressed within Algebra 1-A.

Curricular content for all subjects must integrate critical-thinking, problem-solving, and workforce-literacy skills; communication, reading, and writing skills; mathematics skills; collaboration skills; contextual and applied-learning skills; technology-literacy skills; information and media-literacy skills; and civic-engagement skills.

Special notes: Credit Recovery courses are credit bearing courses with specific content requirements defined by Next Generation Sunshine State Standards and/or Florida Standards. Students enrolled in a Credit Recovery course must have previously attempted the corresponding course (and/or End-of-Course assessment) since the course requirements for the Credit Recovery course are exactly the same as the previously attempted corresponding course. For example, Geometry (1206310) and Geometry for Credit Recovery (1206315) have identical content requirements. It is important to note that Credit Recovery courses are not bound by Section 1003.436(1)(a), Florida Statutes, requiring a minimum of 135 hours of bona fide instruction (120 hours in a school/district implementing block scheduling) in a designed course of study that contains student performance standards, since the students have previously attempted successful completion of the corresponding course. Additionally, Credit Recovery courses should ONLY be used for credit recovery, grade forgiveness, or remediation for students needing to prepare for an End-of-Course assessment retake.

GENERAL NOTES

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards
This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:
https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Number: 1200375

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Algebra >

Abbreviated Title: ALG 1-A CR

Number of Credits: One (1) credit

Course Length: Credit Recovery (R)

Course Type: Elective Course

Course Level: 2

Course Status: Course Approved

Grade Level(s): 9,10,11,12

Educator Certifications

Mathematics (Grades 6-12)
Middle Grades Mathematics (Middle Grades 5-9)

Algebra 1-B (#1200380) 2015 - 2022 (current)

Course Standards

Name	Description
MAFS.912.A-APR.1.1:	Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. **Clarifications:** **Algebra 1 - Fluency Recommendations** Fluency in adding, subtracting, and multiplying polynomials supports students throughout their work in algebra, as well as in their symbolic work with functions. Manipulation can be more mindful when it is fluent.
MAFS.912.A-APR.2.3:	Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.
MAFS.912.A-CED.1.1:	Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational, absolute, and exponential functions. ★
MAFS.912.A-CED.1.2:	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. ★
MAFS.912.A-CED.1.4:	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law V = IR to highlight resistance R.* ★
MAFS.912.A-REI.2.4:	Solve quadratic equations in one variable. a. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x – p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form. b. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.
MAFS.912.A-SSE.1.1:	Interpret expressions that represent a quantity in terms of its context. ★ a. Interpret parts of an expression, such as terms, factors, and coefficients. b. Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret as the product of P and a factor not depending on P.*
MAFS.912.A-SSE.1.2:	Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 - y^4$ as $(x^2)^2 – (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 – y^2)(x^2 + y^2)$.*
MAFS.912.A-SSE.2.3:	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.★ a. Factor a quadratic expression to reveal the zeros of the function it defines. b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. c. Use the properties of exponents to transform expressions for exponential functions. *For example the expression* 1.15^t *can be rewritten as* $(1.15^{1/12})^{12t} \approx 1.012^{12t}$ *to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.*
MAFS.912.F-BF.1.1:	Write a function that describes a relationship between two quantities. ★ a. Determine an explicit expression, a recursive process, or steps for calculation from a context. b. Combine standard function types using arithmetic operations. *For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.* c. Compose functions. *For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time.*
MAFS.912.F-BF.2.3:	Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. *Include recognizing even and odd functions from their graphs and algebraic expressions for them.*
MAFS.912.F-IF.2.4:	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.* ★
MAFS.912.F-IF.2.5:	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble engines in a factory, then the positive integers would be an appropriate domain for the function.* ★
MAFS.912.F-IF.2.6:	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. ★
MAFS.912.F-IF.3.7:	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★ a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.

	e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift.
MAFS.912.F-IF.3.8:	Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. b. Use the properties of exponents to interpret expressions for exponential functions. *For example, identify percent rate of change in functions such as* $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)^{12t}$, $y = (1.2)^{t/10}$, *and classify them as representing exponential growth or decay.*
MAFS.912.F-IF.3.9:	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.*
MAFS.912.F-LE.1.3:	Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function. ★
MAFS.912.N-RN.2.3:	Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.
MAFS.912.S-ID.1.1:	Represent data with plots on the real number line (dot plots, histograms, and box plots). ★ **Clarifications:** In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.2:	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. ★ **Clarifications:** In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.3:	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). ★ **Clarifications:** In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.4:	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. ★
MAFS.912.S-ID.2.5:	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. ★
MAFS.912.S-ID.2.6:	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. ★ a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. *Use given functions or choose a function suggested by the context. Emphasize linear, and exponential models.* b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association. **Clarifications:** Students take a more sophisticated look at using a linear function to model the relationship between two numerical variables. In addition to fitting a line to data, students assess how well the model fits by analyzing residuals.
MAFS.912.S-ID.3.7:	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. ★
MAFS.912.S-ID.3.8:	Compute (using technology) and interpret the correlation coefficient of a linear fit. ★
MAFS.912.S-ID.3.9:	Distinguish between correlation and causation. ★
MAFS.K12.MP.1.1:	**Make sense of problems and persevere in solving them.** Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
MAFS.K12.MP.2.1:	**Reason abstractly and quantitatively**. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Construct viable arguments and critique the reasoning of others. Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from

MAFS.K12.MP.3.1:	which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
MAFS.K12.MP.4.1:	**Model with mathematics.** Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
MAFS.K12.MP.5.1:	**Use appropriate tools strategically.** Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
MAFS.K12.MP.6.1:	**Attend to precision.** Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
MAFS.K12.MP.7.1:	**Look for and make use of structure.** Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
MAFS.K12.MP.8.1:	**Look for and express regularity in repeated reasoning.** Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
LAFS.910.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
LAFS.910.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.
LAFS.910.RST.3.7:	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LAFS.910.SL.1.1:	Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed. c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions. d. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.
LAFS.910.SL.1.2:	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
LAFS.910.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.

LAFS.910.SL.2.4:	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
LAFS.910.WHST.1.1:	Write arguments focused on *discipline-specific content.* a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns. c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.910.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.910.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

VERSION DESCRIPTION

The fundamental purpose of this course is to formalize and extend the mathematics that students learned in the middle grades. The critical areas, called units, deepen and extend understanding of linear and exponential relationships by contrasting them with each other and by applying linear models to data that exhibit a linear trend, and students engage in methods for analyzing, solving, and using quadratic functions. The Standards for Mathematical Practice apply throughout each course and, together with the content standards, prescribe that students experience mathematics as a coherent, useful, and logical subject that makes use of their ability to make sense of problem situations.

Algebra 1A (Year 1)

Unit 1- Relationships Between Quantities and Reasoning with Equations: By the end of eighth grade, students have learned to solve linear equations in one variable and have applied graphical and algebraic methods to analyze and solve systems of linear equations in two variables. Now, students analyze and explain the process of solving an equation. Students develop fluency writing, interpreting, and translating between various forms of linear equations and inequalities, and using them to solve problems. They master the solution of linear equations and apply related solution techniques and the laws of exponents to the creation and solution of simple exponential equations.

Unit 2- Linear and Exponential Relationships: In earlier grades, students define, evaluate, and compare functions, and use them to model relationships between quantities. In this unit, students will learn function notation and develop the concepts of domain and range. They explore many examples of functions, including sequences; they interpret functions given graphically, numerically, symbolically, and verbally, translate between representations, and understand the limitations of various representations. Students build on and informally extend their understanding of integer exponents to consider exponential functions. They compare and contrast linear and exponential functions, distinguishing between additive and multiplicative change. Students explore systems of equations and inequalities, and they find and interpret their solutions. They interpret arithmetic sequences as linear functions and geometric sequences as exponential functions.

Algebra 1B (Year 2)

Unit 3- Descriptive Statistics: This unit builds upon students' prior experiences with data, providing students with more formal means of assessing how a model fits data. Students use regression techniques to describe and approximate linear relationships between quantities. They use graphical representations and knowledge of the context to make judgments about the appropriateness of linear models. With linear models, they look at residuals to analyze the goodness of fit.

Unit 4- Expressions and Equations: In this unit, students build on their knowledge from unit 2, where they extended the laws of exponents to rational exponents. Students apply this new understanding of number and strengthen their ability to see structure in and create quadratic and exponential expressions. They create and solve equations, inequalities, and systems of equations involving quadratic expressions.

Unit 5- Quadratic Functions and Modeling: In this unit, students consider quadratic functions, comparing the key characteristics of quadratic functions to those of linear and exponential functions. They select from among these functions to model phenomena. Students learn to anticipate the graph of a quadratic function by interpreting various forms of quadratic expressions. In particular, they identify the real solutions of a quadratic equation as the zeros of a related quadratic function. Students expand their experience with functions to include more specialized functions, absolute value, step, and those that are piece wise-defined.

GENERAL NOTES

Fluency Recommendations

A/G- Algebra I students become fluent in solving characteristic problems involving the analytic geometry of lines, such as writing down the equation of a line given a point and a slope. Such fluency can support them in solving less routine mathematical problems involving linearity, as well as in modeling linear phenomena (including modeling using systems of linear inequalities in two variables).

A-APR.1- Fluency in adding, subtracting, and multiplying polynomials supports students throughout their work in Algebra, as well as in their symbolic work with functions. Manipulation can be more mindful when it is fluent.

A-SSE.1b- Fluency in transforming expressions and chunking (seeing parts of an expression as a single object) is essential in factoring, completing the square, and other mindful algebraic calculations.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support,

students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

Additional Instructional Resources:
A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGI/cms/review.html?Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

Course Number: 1200380

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Algebra >

Abbreviated Title: ALG 1-B

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- Class Size Core Required

Course Type: Core Academic Course

Course Level: 2

Course Status: Course Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Algebra 1

Educator Certifications

Mathematics (Grades 6-12)
Middle Grades Mathematics (Middle Grades 5-9)

Equivalent Courses

1200386-Pre-Advanced Placement Algebra 1 Equivalency start year: 2018

Algebra 1-B (#1200380) 2022 - And Beyond

Course Standards

Name	Description
MA.912.AR.1.1:	Identify and interpret parts of an equation or expression that represent a quantity in terms of a mathematical or real-world context, including viewing one or more of its parts as a single entity. **Clarifications:** *Clarification 1:* Parts of an expression include factors, terms, constants, coefficients and variables. *Clarification 2:* Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.1.2:	Rearrange equations or formulas to isolate a quantity of interest. **Clarifications:** *Clarification 1*: Instruction includes using formulas for temperature, perimeter, area and volume; using equations for linear (standard, slope-intercept and point-slope forms) and quadratic (standard, factored and vertex forms) functions. *Clarification 2*: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.1.3:	Add, subtract and multiply polynomial expressions with rational number coefficients. **Clarifications:** *Clarification 1: I*nstruction includes an understanding that when any of these operations are performed with polynomials the result is also a polynomial. *Clarification 2:* Within the Algebra 1 course, polynomial expressions are limited to 3 or fewer terms.
MA.912.AR.1.4:	Divide a polynomial expression by a monomial expression with rational number coefficients. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, polynomial expressions are limited to 3 or fewer terms.
MA.912.AR.1.7:	Rewrite a polynomial expression as a product of polynomials over the real number system. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, polynomial expressions are limited to 4 or fewer terms with integer coefficients.
MA.912.AR.3.1:	Given a mathematical or real-world context, write and solve one-variable quadratic equations over the real number system. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, instruction includes the concept of non-real answers, without determining non-real solutions. *Clarification 2:* Within this benchmark, the expectation is to solve by factoring techniques, taking square roots, the quadratic formula and completing the square.
MA.912.AR.3.4:	Write a quadratic function to represent the relationship between two quantities from a graph, a written description or a table of values within a mathematical or real-world context. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, a graph, written description or table of values must include the vertex and two points that are equidistant from the vertex. *Clarification 2*: Instruction includes the use of standard form, factored form and vertex form. *Clarification 3*: Within the Algebra 2 course, one of the given points must be the vertex or an *x*-intercept.
MA.912.AR.3.5:	Given the x-intercepts and another point on the graph of a quadratic function, write the equation for the function.
MA.912.AR.3.6:	Given an expression or equation representing a quadratic function, determine the vertex and zeros and interpret them in terms of a real-world context.
MA.912.AR.3.7:	Given a table, equation or written description of a quadratic function, graph that function, and determine and interpret its key features. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior; vertex; and symmetry. *Clarification 2*: Instruction includes the use of standard form, factored form and vertex form, and sketching a graph using the zeros and vertex. *Clarification 3*: Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation. *Clarification 4*: Within the Algebra 1 course, notations for domain and range are limited to inequality and set-builder.
MA.912.AR.3.8:	Solve and graph mathematical and real-world problems that are modeled with quadratic functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior; vertex; and symmetry. *Clarification 2*: Instruction includes the use of standard form, factored form and vertex form. *Clarification 3*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation. *Clarification 4*: Within the Algebra 1 course, notations for domain, range and constraints are limited to inequality and set-builder.

MA.912.AR.5.3:	Given a mathematical or real-world context, classify an exponential function as representing growth or decay. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, exponential functions are limited to the forms $f(x) = ab^x$, where *b* is a whole number greater than 1 or a unit fraction, or $f(x) = a(1 \pm r)^x$, where $0 < r < 1$.
MA.912.AR.5.4:	Write an exponential function to represent a relationship between two quantities from a graph, a written description or a table of values within a mathematical or real-world context. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, exponential functions are limited to the forms $f(x) = ab^x$, where *b* is a whole number greater than 1 or a unit fraction, or $f(x) = a(1 \pm r)^x$, where $0 < r < 1$. *Clarification 2:* Within the Algebra 1 course, tables are limited to having successive nonnegative integer inputs so that the function may be determined by finding ratios between successive outputs.
MA.912.AR.5.6:	Given a table, equation or written description of an exponential function, graph that function and determine its key features. **Clarifications:** *Clarification 1:* Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; constant percent rate of change; end behavior and asymptotes. *Clarification 2:* Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation. *Clarification 3:* Within the Algebra 1 course, notations for domain and range are limited to inequality and set-builder. *Clarification 4:* Within the Algebra 1 course, exponential functions are limited to the forms $f(x) = ab^x$, where *b* is a whole number greater than 1 or a unit fraction or $f(x) = a(1 \pm r)^x$, where $0 < r < 1$.
MA.912.AR.9.6:	Given a real-world context, represent constraints as systems of linear equations or inequalities. Interpret solutions to problems as viable or non-viable options. **Clarifications:** *Clarification 1*: Instruction focuses on analyzing a given function that models a real-world situation and writing constraints that are represented as linear equations or linear inequalities.
MA.912.DP.1.1:	Given a set of data, select an appropriate method to represent the data, depending on whether it is numerical or categorical data and on whether it is univariate or bivariate. **Clarifications:** *Clarification 1:* Instruction includes discussions regarding the strengths and weaknesses of each data display. *Clarification 2:* Numerical univariate includes histograms, stem-and-leaf plots, box plots and line plots; numerical bivariate includes scatter plots and line graphs; categorical univariate includes bar charts, circle graphs, line plots, frequency tables and relative frequency tables; and categorical bivariate includes segmented bar charts, joint frequency tables and joint relative frequency tables. *Clarification 3:* Instruction includes the use of appropriate units and labels and, where appropriate, using technology to create data displays.
MA.912.DP.1.2:	Interpret data distributions represented in various ways. State whether the data is numerical or categorical, whether it is univariate or bivariate and interpret the different components and quantities in the display. **Clarifications:** *Clarification 1*: Within the Probability and Statistics course, instruction includes the use of spreadsheets and technology.
MA.912.DP.1.4:	Estimate a population total, mean or percentage using data from a sample survey; develop a margin of error through the use of simulation. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, the margin of error will be given.
MA.912.DP.3.1:	Construct a two-way frequency table summarizing bivariate categorical data. Interpret joint and marginal frequencies and determine possible associations in terms of a real-world context.
MA.912.F.1.1:	Given an equation or graph that defines a function, determine the function type. Given an input-output table, determine a function type that could represent it. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, functions represented as tables are limited to linear, quadratic and exponential. *Clarification 2:* Within the Algebra 1 course, functions represented as equations or graphs are limited to vertical or horizontal translations or reflections over the x-axis of the following parent functions: $f(x) = x$, $f(x) = x^2$, $f(x) = x^3$, $f(x) = \sqrt{x}$, $f(x) = \sqrt[3]{x}$, $f(x) = \|x\|$, $f(x) = 2^x$ and $f(x) = \left(\frac{1}{2}\right)^x$.
MA.912.F.1.2:	Given a function represented in function notation, evaluate the function for an input in its domain. For a real-world context, interpret the output. **Clarifications:** *Clarification 1*: Problems include simple functions in two-variables, such as f(x,y)=3x-2y. *Clarification 2*: Within the Algebra 1 course, functions are limited to one-variable such as f(x)=3x.
MA.912.F.1.3:	Calculate and interpret the average rate of change of a real-world situation represented graphically, algebraically or in a table over a specified interval. **Clarifications:** *Clarification 1*: Instruction includes making the connection to determining the slope of a particular line segment.
MA.912.F.1.6:	Compare key features of linear and nonlinear functions each represented algebraically, graphically, in tables or written descriptions. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior and asymptotes. *Clarification 2*: Within the Algebra 1 course, functions other than linear, quadratic or exponential must be represented graphically.

	Clarification 3: Within the Algebra 1 course, instruction includes verifying that a quantity increasing exponentially eventually exceeds a quantity increasing linearly or quadratically.
MA.912.F.1.8:	Determine whether a linear, quadratic or exponential function best models a given real-world situation. **Clarifications:** *Clarification 1*: Instruction includes recognizing that linear functions model situations in which a quantity changes by a constant amount per unit interval; that quadratic functions model situations in which a quantity increases to a maximum, then begins to decrease or a quantity decreases to a minimum, then begins to increase; and that exponential functions model situations in which a quantity grows or decays by a constant percent per unit interval. *Clarification 2*: Within this benchmark, the expectation is to identify the type of function from a written description or table.
MA.912.F.2.1:	Identify the effect on the graph or table of a given function after replacing $f(x)$ by $f(x)+k$,$kf(x)$, $f(kx)$ and $f(x+k)$ for specific values of k. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, functions are limited to linear, quadratic and absolute value. *Clarification 2*: Instruction focuses on including positive and negative values for k.
MA.912.FL.3.2:	Solve real-world problems involving simple, compound and continuously compounded interest. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, interest is limited to simple and compound.
MA.912.FL.3.4:	Explain the relationship between simple interest and linear growth. Explain the relationship between compound interest and exponential growth and the relationship between continuously compounded interest and exponential growth. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, exponential growth is limited to compound interest.
MA.912.NSO.1.1:	Extend previous understanding of the Laws of Exponents to include rational exponents. Apply the Laws of Exponents to evaluate numerical expressions and generate equivalent numerical expressions involving rational exponents. **Clarifications:** *Clarification 1:* Instruction includes the use of technology when appropriate. *Clarification 2:* Refer to the K-12 Formulas (Appendix E) for the Laws of Exponents. *Clarification 3:* Instruction includes converting between expressions involving rational exponents and expressions involving radicals. *Clarification 4:*Within the Mathematics for Data and Financial Literacy course, it is not the expectation to generate equivalent numerical expressions.
MA.912.NSO.1.2:	Generate equivalent algebraic expressions using the properties of exponents.
MA.912.NSO.1.4:	Apply previous understanding of operations with rational numbers to add, subtract, multiply and divide numerical radicals. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, expressions are limited to a single arithmetic operation involving two square roots or two cube roots.
MA.K12.MTR.1.1:	Mathematicians who participate in effortful learning both individually and with others: • Analyze the problem in a way that makes sense given the task. • Ask questions that will help with solving the task. • Build perseverance by modifying methods as needed while solving a challenging task. • Stay engaged and maintain a positive mindset when working to solve tasks. • Help and support each other when attempting a new method or approach. **Clarifications:** Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: • Build understanding through modeling and using manipulatives. • Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. • Progress from modeling problems with objects and drawings to using algorithms and equations. • Express connections between concepts and representations. • Choose a representation based on the given context or purpose. **Clarifications:** Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations.

	Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: • Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. • Offer multiple opportunities for students to practice efficient and generalizable methods. • Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: • Communicate mathematical ideas, vocabulary and methods effectively. • Analyze the mathematical thinking of others. • Compare the efficiency of a method to those expressed by others. • Recognize errors and suggest how to correctly solve the task. • Justify results by explaining methods and processes. • Construct possible arguments based on evidence. **Clarifications:** Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. **Clarifications:** Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. **Clarifications:** Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems. • Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. **Clarifications:** Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. **Clarifications:** K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide

	referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. **Clarifications:** See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. **Clarifications:** Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like “Why is the girl smiling?” or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. **Clarifications:** In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: “I think _______ because ______.” The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. **Clarifications:** Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. **Clarifications:** In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

General Course Information and Notes

VERSION DESCRIPTION

In Algebra 1-B, instructional time will emphasize four areas: (1) performing operations with polynomials and radicals, and extending the Laws of Exponents to include rational exponents; (2) extending understanding of functions to quadratic and exponential functions and using them to model and analyze real-world relationships; (3) solving quadratic equations in one variables and (4) building functions, identifying their key features and representing them in various ways.

All clarifications stated, whether general or specific to Algebra I-B, are expectations for instruction of that benchmark. Please note that all clarifications that address Algebra 1 also should be addressed within Algebra 1-B.

Curricular content for all subjects must integrate critical-thinking, problem-solving, and workforce-literacy skills; communication, reading, and writing skills; mathematics skills; collaboration skills; contextual and applied-learning skills; technology-literacy skills; information and media-literacy skills; and civic-engagement skills.

GENERAL NOTES

Florida’s Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards
This course includes Florida’s B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL’s need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Path: Section: Grades PreK to 12 Education

Course Number: 1200380

Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Algebra >

Abbreviated Title: ALG 1-B

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- Class Size Core Required

Course Type: Core Academic Course

Course Level: 2

Course Status: State Board Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Algebra 1

Educator Certifications

Mathematics (Grades 6-12)
Middle Grades Mathematics (Middle Grades 5-9)

Equivalent Courses

1200386-Pre-Advanced Placement Algebra 1
Equivalency start year: 2018

Algebra 1-B for Credit Recovery (#1200385) 2015 - 2022 (current)

Course Standards

Name	Description
MAFS.912.A-APR.1.1:	Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. **Clarifications:** **Algebra 1 - Fluency Recommendations** Fluency in adding, subtracting, and multiplying polynomials supports students throughout their work in algebra, as well as in their symbolic work with functions. Manipulation can be more mindful when it is fluent.
MAFS.912.A-APR.2.3:	Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.
MAFS.912.A-CED.1.1:	Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational, absolute, and exponential functions. ★
MAFS.912.A-CED.1.2:	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. ★
MAFS.912.A-CED.1.4:	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law V = IR to highlight resistance R.* ★
MAFS.912.A-REI.2.4:	Solve quadratic equations in one variable. a. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x – p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form. b. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.
MAFS.912.A-SSE.1.1:	Interpret expressions that represent a quantity in terms of its context. ★ a. Interpret parts of an expression, such as terms, factors, and coefficients. b. Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret □ as the product of P and a factor not depending on P.*
MAFS.912.A-SSE.1.2:	Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 - y^4$ as $(x^2)^2 – (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 – y^2)(x^2 + y^2)$.*
MAFS.912.A-SSE.2.3:	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.★ a. Factor a quadratic expression to reveal the zeros of the function it defines. b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. c. Use the properties of exponents to transform expressions for exponential functions. *For example the expression* 1.15^t *can be rewritten as* $(1.15^{1/12})^{12t} \approx 1.012^{12t}$ *to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.*
MAFS.912.F-BF.1.1:	Write a function that describes a relationship between two quantities. ★ a. Determine an explicit expression, a recursive process, or steps for calculation from a context. b. Combine standard function types using arithmetic operations. *For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.* c. Compose functions. *For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time.*
MAFS.912.F-BF.2.3:	Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. *Include recognizing even and odd functions from their graphs and algebraic expressions for them.*
MAFS.912.F-IF.2.4:	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.* ★
MAFS.912.F-IF.2.5:	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble engines in a factory, then the positive integers would be an appropriate domain for the function.* ★
MAFS.912.F-IF.2.6:	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. ★
MAFS.912.F-IF.3.7:	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★ a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.

	e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift.
MAFS.912.F-IF.3.8:	Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. b. Use the properties of exponents to interpret expressions for exponential functions. *For example, identify percent rate of change in functions such as* $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)^{12t}$, $y = (1.2)^{t/10}$, *and classify them as representing exponential growth or decay.*
MAFS.912.F-IF.3.9:	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.*
MAFS.912.F-LE.1.3:	Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function. ★
MAFS.912.N-RN.2.3:	Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.
MAFS.912.S-ID.1.1:	Represent data with plots on the real number line (dot plots, histograms, and box plots). ★ **Clarifications:** In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.2:	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. ★ **Clarifications:** In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.3:	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). ★ **Clarifications:** In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.4:	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. ★
MAFS.912.S-ID.2.5:	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. ★
MAFS.912.S-ID.2.6:	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. ★ a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. *Use given functions or choose a function suggested by the context. Emphasize linear, and exponential models.* b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association. **Clarifications:** Students take a more sophisticated look at using a linear function to model the relationship between two numerical variables. In addition to fitting a line to data, students assess how well the model fits by analyzing residuals.
MAFS.912.S-ID.3.7:	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. ★
MAFS.912.S-ID.3.8:	Compute (using technology) and interpret the correlation coefficient of a linear fit. ★
MAFS.912.S-ID.3.9:	Distinguish between correlation and causation. ★
MAFS.K12.MP.1.1:	**Make sense of problems and persevere in solving them.** Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
MAFS.K12.MP.2.1:	**Reason abstractly and quantitatively**. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Construct viable arguments and critique the reasoning of others. Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from

MAFS.K12.MP.3.1:	which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
MAFS.K12.MP.4.1:	**Model with mathematics.** Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
MAFS.K12.MP.5.1:	**Use appropriate tools strategically.** Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
MAFS.K12.MP.6.1:	**Attend to precision.** Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
MAFS.K12.MP.7.1:	**Look for and make use of structure.** Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
MAFS.K12.MP.8.1:	**Look for and express regularity in repeated reasoning.** Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
LAFS.910.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.
LAFS.910.RST.3.7:	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LAFS.910.SL.1.1:	Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed. c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions. d. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.
LAFS.910.SL.1.2:	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
LAFS.910.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.
LAFS.910.SL.2.4:	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.

LAFS.910.WHST.1.1:	Write arguments focused on *discipline-specific content.* a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns. c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.910.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.910.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

VERSION DESCRIPTION

Special Notes: Credit Recovery courses are credit bearing courses with specific content requirements defined by Next Generation Sunshine State Standards and/or Florida Standards. Students enrolled in a Credit Recovery course must have previously attempted the corresponding course (and/or End-of-Course assessment) since the course requirements for the Credit Recovery course is exactly the same as the previously attempted corresponding course. For example, Geometry (1206310) and Geometry for Credit Recovery (1206315) have identical content requirements. It is important to note that Credit Recovery courses are not bound by Section 1003.436(1)(a), Florida Statutes, requiring a minimum of 135 hours of bona fide instruction (120 hours in a school/district implementing block scheduling) in a designed course of study that contains student performance standards, since the students have previously attempted successful completion of the corresponding course. Additionally, Credit Recovery courses should ONLY be used for credit recovery, grade forgiveness, or remediation for students needing to prepare for an End-of-Course assessment retake.

GENERAL NOTES

The fundamental purpose of this course is to formalize and extend the mathematics that students learned in the middle grades. The critical areas, called units, deepen and extend understanding of linear and exponential relationships by contrasting them with each other and by applying linear models to data that exhibit a linear trend, and students engage in methods for analyzing, solving, and using quadratic functions. The Standards for Mathematical Practice apply throughout each course and, together with the content standards, prescribe that students experience mathematics as a coherent, useful, and logical subject that makes use of their ability to make sense of problem situations.

Algebra 1A (Year 1)

Unit 1- Relationships Between Questions and Reasoning with Equations: By the end of eighth grade, students have learned to solve linear equations in one variable and have applied graphical and algebraic methods to analyze and solve systems of linear equations in two variables. Now, students analyze and explain the process of solving an equation. Students develop fluency writing, interpreting, and translating between various forms of linear equations and inequalities, and using them to solve problems. They master the solution of linear equations and apply related solution techniques and the laws of exponents to the creation and solution of simple exponential equations.

Unit 2- Linear and Exponential Relationships: In earlier grades, students define, evaluate, and compare functions, and use them to model relationships between quantities. In this unit, students will learn function notation and develop the concepts of domain and range. They explore many examples of functions, including sequences; they interpret functions given graphically, numerically, symbolically, and verbally, translate between representations, and understand the limitations of various representations. Students build on and informally extend their understanding of integer exponents to consider exponential functions. They compare and contrast linear and exponential functions, distinguishing between additive and multiplicative change. Students explore systems of equations and inequalities, and they find and interpret their solutions. They interpret arithmetic sequences as linear functions and geometric sequences as exponential functions.

Algebra 1B (Year 2)

Unit 3- Descriptive Statistics: This unit builds upon students prior experiences with data, providing students with more formal means of assessing how a model fits data. Students use regression techniques to describe and approximate linear relationships between quantities. They use graphical representations and knowledge of the context to make judgments about the appropriateness of linear models. With linear models, they look at residuals to analyze the goodness of fit.

Unit 4- Expressions and Equations: In this unit, students build on their knowledge from unit 2, where they extended the laws of exponents to rational exponents. Students apply this new understanding of number and strengthen their ability to see structure in and create quadratic and exponential expressions. They create and solve equations, inequalities, and systems of equations involving quadratic expressions.

Unit 5- Quadratic Functions and Modeling: In this unit, students consider quadratic functions, comparing the key characteristics of quadratic functions to those of linear and exponential functions. They select from among these functions to model phenomena. Students learn to anticipate the graph of a quadratic function by interpreting various forms of quadratic expressions. In particular, they identify the real solutions of a quadratic equation as the zeros of a related quadratic function. Students expand their experience with functions to include more specialized functions absolute value, step, and those that are piece wise-defined.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and

concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

VERSION REQUIREMENTS

Fluency Recommendations

A/G- Algebra I students become fluent in solving characteristic problems involving the analytic geometry of lines, such as writing down the equation of a line given a point and a slope. Such fluency can support them in solving less routine mathematical problems involving linearity, as well as in modeling linear phenomena (including modeling using systems of linear inequalities in two variables).

A-APR.1- Fluency in adding, subtracting, and multiplying polynomials supports students throughout their work in Algebra, as well as in their symbolic work with functions. Manipulation can be more mindful when it is fluent.

A-SSE.1b- Fluency in transforming expressions and chunking (seeing parts of an expression as a single object) is essential in factoring, completing the square, and other mindful algebraic calculations.

GENERAL INFORMATION

Course Number: 1200385

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Algebra >

Abbreviated Title: ALG 1-B CR

Number of Credits: One (1) credit

Course Length: Credit Recovery (R)

Course Type: Elective Course

Course Level: 2

Course Status: Course Approved

Grade Level(s): 9,10,11,12

Educator Certifications

Mathematics (Grades 6-12)
Middle Grades Mathematics (Middle Grades 5-9)

Algebra 1-B for Credit Recovery (#1200385) 2022 - And Beyond

Course Standards

Name	Description
MA.912.AR.1.1:	Identify and interpret parts of an equation or expression that represent a quantity in terms of a mathematical or real-world context, including viewing one or more of its parts as a single entity. **Clarifications:** *Clarification 1:* Parts of an expression include factors, terms, constants, coefficients and variables. *Clarification 2:* Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.1.2:	Rearrange equations or formulas to isolate a quantity of interest. **Clarifications:** *Clarification 1*: Instruction includes using formulas for temperature, perimeter, area and volume; using equations for linear (standard, slope-intercept and point-slope forms) and quadratic (standard, factored and vertex forms) functions. *Clarification 2*: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.1.3:	Add, subtract and multiply polynomial expressions with rational number coefficients. **Clarifications:** *Clarification 1: I*nstruction includes an understanding that when any of these operations are performed with polynomials the result is also a polynomial. *Clarification 2:* Within the Algebra 1 course, polynomial expressions are limited to 3 or fewer terms.
MA.912.AR.1.4:	Divide a polynomial expression by a monomial expression with rational number coefficients. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, polynomial expressions are limited to 3 or fewer terms.
MA.912.AR.1.7:	Rewrite a polynomial expression as a product of polynomials over the real number system. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, polynomial expressions are limited to 4 or fewer terms with integer coefficients.
MA.912.AR.3.1:	Given a mathematical or real-world context, write and solve one-variable quadratic equations over the real number system. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, instruction includes the concept of non-real answers, without determining non-real solutions. *Clarification 2:* Within this benchmark, the expectation is to solve by factoring techniques, taking square roots, the quadratic formula and completing the square.
MA.912.AR.3.4:	Write a quadratic function to represent the relationship between two quantities from a graph, a written description or a table of values within a mathematical or real-world context. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, a graph, written description or table of values must include the vertex and two points that are equidistant from the vertex. *Clarification 2*: Instruction includes the use of standard form, factored form and vertex form. *Clarification 3*: Within the Algebra 2 course, one of the given points must be the vertex or an *x*-intercept.
MA.912.AR.3.5:	Given the x-intercepts and another point on the graph of a quadratic function, write the equation for the function.
MA.912.AR.3.6:	Given an expression or equation representing a quadratic function, determine the vertex and zeros and interpret them in terms of a real-world context.
MA.912.AR.3.7:	Given a table, equation or written description of a quadratic function, graph that function, and determine and interpret its key features. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior; vertex; and symmetry. *Clarification 2*: Instruction includes the use of standard form, factored form and vertex form, and sketching a graph using the zeros and vertex. *Clarification 3*: Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation. *Clarification 4*: Within the Algebra 1 course, notations for domain and range are limited to inequality and set-builder.
MA.912.AR.3.8:	Solve and graph mathematical and real-world problems that are modeled with quadratic functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior; vertex; and symmetry. *Clarification 2*: Instruction includes the use of standard form, factored form and vertex form. *Clarification 3*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation. *Clarification 4*: Within the Algebra 1 course, notations for domain, range and constraints are limited to inequality and set-builder.

MA.912.AR.5.3:	Given a mathematical or real-world context, classify an exponential function as representing growth or decay. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, exponential functions are limited to the forms $f(x) = ab^x$, where *b* is a whole number greater than 1 or a unit fraction, or $f(x) = a(1 \pm r)^x$, where $0 < r < 1$.
MA.912.AR.5.4:	Write an exponential function to represent a relationship between two quantities from a graph, a written description or a table of values within a mathematical or real-world context. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, exponential functions are limited to the forms $f(x) = ab^x$, where *b* is a whole number greater than 1 or a unit fraction, or $f(x) = a(1 \pm r)^x$, where $0 < r < 1$. *Clarification 2:* Within the Algebra 1 course, tables are limited to having successive nonnegative integer inputs so that the function may be determined by finding ratios between successive outputs.
MA.912.AR.5.6:	Given a table, equation or written description of an exponential function, graph that function and determine its key features. **Clarifications:** *Clarification 1:* Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; constant percent rate of change; end behavior and asymptotes. *Clarification 2:* Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation. *Clarification 3:* Within the Algebra 1 course, notations for domain and range are limited to inequality and set-builder. *Clarification 4:* Within the Algebra 1 course, exponential functions are limited to the forms $f(x) = ab^x$, where *b* is a whole number greater than 1 or a unit fraction or $f(x) = a(1 \pm r)^x$, where $0 < r < 1$.
MA.912.AR.9.6:	Given a real-world context, represent constraints as systems of linear equations or inequalities. Interpret solutions to problems as viable or non-viable options. **Clarifications:** *Clarification 1*: Instruction focuses on analyzing a given function that models a real-world situation and writing constraints that are represented as linear equations or linear inequalities.
MA.912.DP.1.1:	Given a set of data, select an appropriate method to represent the data, depending on whether it is numerical or categorical data and on whether it is univariate or bivariate. **Clarifications:** *Clarification 1:* Instruction includes discussions regarding the strengths and weaknesses of each data display. *Clarification 2:* Numerical univariate includes histograms, stem-and-leaf plots, box plots and line plots; numerical bivariate includes scatter plots and line graphs; categorical univariate includes bar charts, circle graphs, line plots, frequency tables and relative frequency tables; and categorical bivariate includes segmented bar charts, joint frequency tables and joint relative frequency tables. *Clarification 3:* Instruction includes the use of appropriate units and labels and, where appropriate, using technology to create data displays.
MA.912.DP.1.2:	Interpret data distributions represented in various ways. State whether the data is numerical or categorical, whether it is univariate or bivariate and interpret the different components and quantities in the display. **Clarifications:** *Clarification 1*: Within the Probability and Statistics course, instruction includes the use of spreadsheets and technology.
MA.912.DP.1.4:	Estimate a population total, mean or percentage using data from a sample survey; develop a margin of error through the use of simulation. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, the margin of error will be given.
MA.912.DP.3.1:	Construct a two-way frequency table summarizing bivariate categorical data. Interpret joint and marginal frequencies and determine possible associations in terms of a real-world context.
MA.912.F.1.1:	Given an equation or graph that defines a function, determine the function type. Given an input-output table, determine a function type that could represent it. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, functions represented as tables are limited to linear, quadratic and exponential. *Clarification 2:* Within the Algebra 1 course, functions represented as equations or graphs are limited to vertical or horizontal translations or reflections over the x-axis of the following parent functions: $f(x) = x$, $f(x) = x^2$, $f(x) = x^3$, $f(x) = \sqrt{x}$, $f(x) = \sqrt[3]{x}$, $f(x) = \lvert x \rvert$, $f(x) = 2^x$ and $f(x) = \left(\frac{1}{2}\right)^x$.
MA.912.F.1.2:	Given a function represented in function notation, evaluate the function for an input in its domain. For a real-world context, interpret the output. **Clarifications:** *Clarification 1*: Problems include simple functions in two-variables, such as f(x,y)=3x-2y. *Clarification 2*: Within the Algebra 1 course, functions are limited to one-variable such as f(x)=3x.
MA.912.F.1.3:	Calculate and interpret the average rate of change of a real-world situation represented graphically, algebraically or in a table over a specified interval. **Clarifications:** *Clarification 1*: Instruction includes making the connection to determining the slope of a particular line segment.
MA.912.F.1.6:	Compare key features of linear and nonlinear functions each represented algebraically, graphically, in tables or written descriptions. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior and asymptotes. *Clarification 2*: Within the Algebra 1 course, functions other than linear, quadratic or exponential must be represented graphically.

	Clarification 3: Within the Algebra 1 course, instruction includes verifying that a quantity increasing exponentially eventually exceeds a quantity increasing linearly or quadratically.
MA.912.F.1.8:	Determine whether a linear, quadratic or exponential function best models a given real-world situation. **Clarifications:** *Clarification 1*: Instruction includes recognizing that linear functions model situations in which a quantity changes by a constant amount per unit interval; that quadratic functions model situations in which a quantity increases to a maximum, then begins to decrease or a quantity decreases to a minimum, then begins to increase; and that exponential functions model situations in which a quantity grows or decays by a constant percent per unit interval. *Clarification 2*: Within this benchmark, the expectation is to identify the type of function from a written description or table.
MA.912.F.2.1:	Identify the effect on the graph or table of a given function after replacing $f(x)$ by $f(x)+k$,$kf(x)$, $f(kx)$ and $f(x+k)$ for specific values of k. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, functions are limited to linear, quadratic and absolute value. *Clarification 2*: Instruction focuses on including positive and negative values for k.
MA.912.FL.3.2:	Solve real-world problems involving simple, compound and continuously compounded interest. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, interest is limited to simple and compound.
MA.912.FL.3.4:	Explain the relationship between simple interest and linear growth. Explain the relationship between compound interest and exponential growth and the relationship between continuously compounded interest and exponential growth. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, exponential growth is limited to compound interest.
MA.912.NSO.1.1:	Extend previous understanding of the Laws of Exponents to include rational exponents. Apply the Laws of Exponents to evaluate numerical expressions and generate equivalent numerical expressions involving rational exponents. **Clarifications:** *Clarification 1:* Instruction includes the use of technology when appropriate. *Clarification 2:* Refer to the K-12 Formulas (Appendix E) for the Laws of Exponents. *Clarification 3:* Instruction includes converting between expressions involving rational exponents and expressions involving radicals. *Clarification 4:*Within the Mathematics for Data and Financial Literacy course, it is not the expectation to generate equivalent numerical expressions.
MA.912.NSO.1.2:	Generate equivalent algebraic expressions using the properties of exponents.
MA.912.NSO.1.4:	Apply previous understanding of operations with rational numbers to add, subtract, multiply and divide numerical radicals. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, expressions are limited to a single arithmetic operation involving two square roots or two cube roots.
MA.K12.MTR.1.1:	Mathematicians who participate in effortful learning both individually and with others: • Analyze the problem in a way that makes sense given the task. • Ask questions that will help with solving the task. • Build perseverance by modifying methods as needed while solving a challenging task. • Stay engaged and maintain a positive mindset when working to solve tasks. • Help and support each other when attempting a new method or approach. **Clarifications:** Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: • Build understanding through modeling and using manipulatives. • Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. • Progress from modeling problems with objects and drawings to using algorithms and equations. • Express connections between concepts and representations. • Choose a representation based on the given context or purpose. **Clarifications:** Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations.

	Clarifications: Teachers who encourage students to complete tasks with mathematical fluency: • Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. • Offer multiple opportunities for students to practice efficient and generalizable methods. • Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: • Communicate mathematical ideas, vocabulary and methods effectively. • Analyze the mathematical thinking of others. • Compare the efficiency of a method to those expressed by others. • Recognize errors and suggest how to correctly solve the task. • Justify results by explaining methods and processes. • Construct possible arguments based on evidence. **Clarifications:** Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students’ ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. **Clarifications:** Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students’ ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. **Clarifications:** Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, “Does this solution make sense? How do you know?” • Reinforce that students check their work as they progress within and after a task. • Strengthen students’ ability to verify solutions through justifications.
MA.K12.MTR.7.1:	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems. • Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. **Clarifications:** Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. **Clarifications:** K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they’ve directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide

	referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. **Clarifications:** See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. **Clarifications:** Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like “Why is the girl smiling?” or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. **Clarifications:** In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: “I think _______ because ______.” The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. **Clarifications:** Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. **Clarifications:** In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

General Course Information and Notes

VERSION DESCRIPTION

In Algebra 1-B, instructional time will emphasize four areas: (1) performing operations with polynomials and radicals, and extending the Laws of Exponents to include rational exponents; (2) extending understanding of functions to quadratic and exponential functions and using them to model and analyze real-world relationships; (3) solving quadratic equations in one variables and (4) building functions, identifying their key features and representing them in various ways.

All clarifications stated, whether general or specific to Algebra I-B, are expectations for instruction of that benchmark. Please note that all clarifications that address Algebra 1 also should be addressed within Algebra 1-B.

Curricular content for all subjects must integrate critical-thinking, problem-solving, and workforce-literacy skills; communication, reading, and writing skills; mathematics skills; collaboration skills; contextual and applied-learning skills; technology-literacy skills; information and media-literacy skills; and civic-engagement skills.

Special Notes: Credit Recovery courses are credit bearing courses with specific content requirements defined by Next Generation Sunshine State Standards and/or Florida Standards. Students enrolled in a Credit Recovery course must have previously attempted the corresponding course (and/or End-of-Course assessment) since the course requirements for the Credit Recovery course is exactly the same as the previously attempted corresponding course. For example, Geometry (1206310) and Geometry for Credit Recovery (1206315) have identical content requirements. It is important to note that Credit Recovery courses are not bound by Section 1003.436(1)(a), Florida Statutes, requiring a minimum of 135 hours of bona fide instruction (120 hours in a school/district implementing block scheduling) in a designed course of study that contains student performance standards, since the students have previously attempted successful completion of the corresponding course. Additionally, Credit Recovery courses should ONLY be used for credit recovery, grade forgiveness, or remediation for students needing to prepare for an End-of-Course assessment retake.

GENERAL NOTES

Florida’s Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards
This course includes Florida’s B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL’s need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:

GENERAL INFORMATION

Course Number: 1200385

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Algebra >

Abbreviated Title: ALG 1-B CR

Number of Credits: One (1) credit

Course Length: Credit Recovery (R)

Course Type: Elective Course

Course Level: 2

Course Status: Course Approved

Grade Level(s): 9,10,11,12

Educator Certifications

Mathematics (Grades 6-12)
Middle Grades Mathematics (Middle Grades 5-9)

Pre-Advanced Placement Algebra 1 (#1200386) 2018 - And Beyond (current)

General Course Information and Notes

VERSION DESCRIPTION

The course description for this Pre-Advanced Placement (Pre-AP) course is located on the College Board site at https://pre-ap.collegeboard.org/courses.

GENERAL NOTES

Students enrolled in this course are required to take the Algebra 1 FSA EOC. Information on the EOC, including test item specifications, can be found at https://www.fldoe.org/accountability/assessments/k-12-student-assessment/end-of-course-eoc-assessments/.

GENERAL INFORMATION

Course Number: 1200386

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Algebra >

Abbreviated Title: PRE-AP ALGEBRA 1

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- Honors

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 9

Graduation Requirement: Algebra 1

Educator Certifications

Mathematics (Grades 6-12)
Middle Grades Mathematics (Middle Grades 5-9)

Equivalent Courses

1200320-Algebra 1 Honors Equivalency start year: 2018
1200380-Algebra 1-B Equivalency start year: 2018
1209810-Cambridge Pre-AICE Mathematics 1 IGCSE Level Equivalency start year: 2018
1200390-International Baccalaureate Mid Yrs Prog Algebra 1 Equivalency start year: 2018

Financial Algebra (#1200387) 2016 - 2022 (current)

Course Standards

Name	Description
MAFS.912.A-APR.1.1:	Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. **Clarifications:** **Algebra 1 - Fluency Recommendations** Fluency in adding, subtracting, and multiplying polynomials supports students throughout their work in algebra, as well as in their symbolic work with functions. Manipulation can be more mindful when it is fluent.
MAFS.912.A-APR.2.2:	Know and apply the Remainder Theorem: For a polynomial p(x) and a number a, the remainder on division by x – a is p(a), so p(a) = 0 if and only if (x – a) is a factor of p(x).
MAFS.912.A-APR.2.3:	Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.
MAFS.912.A-CED.1.1:	Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational, absolute, and exponential functions. ★
MAFS.912.A-CED.1.2:	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. ★
MAFS.912.A-CED.1.3:	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.* ★
MAFS.912.A-CED.1.4:	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law V = IR to highlight resistance R.* ★
MAFS.912.A-REI.1.1:	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
MAFS.912.A-REI.1.2:	Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.
MAFS.912.A-REI.3.6:	Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
MAFS.912.A-REI.3.7:	Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. *For example, find the points of intersection between the line* $y = -3x$ *and the circle* $x^2 + y^2 = 3$.
MAFS.912.A-REI.3.8:	Represent a system of linear equations as a single matrix equation in a vector variable.
MAFS.912.A-REI.3.9:	Find the inverse of a matrix if it exists and use it to solve systems of linear equations (using technology for matrices of dimension 3 × 3 or greater).
MAFS.912.A-SSE.1.1:	Interpret expressions that represent a quantity in terms of its context. ★ a. Interpret parts of an expression, such as terms, factors, and coefficients. b. Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret as the product of P and a factor not depending on P.*
MAFS.912.A-SSE.2.3:	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.★ a. Factor a quadratic expression to reveal the zeros of the function it defines. b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. c. Use the properties of exponents to transform expressions for exponential functions. *For example the expression* 1.15^t *can be rewritten as* $(1.15^{1/12})^{12t} \approx 1.012^{12t}$ *to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.*
MAFS.912.A-SSE.2.4:	Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. *For example, calculate mortgage payments.* ★
MAFS.912.F-BF.1.1:	Write a function that describes a relationship between two quantities. ★ a. Determine an explicit expression, a recursive process, or steps for calculation from a context. b. Combine standard function types using arithmetic operations. *For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.* c. Compose functions. *For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time.*
MAFS.912.F-BF.1.2:	Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms. ★
MAFS.912.F-BF.2.5:	Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.
MAFS.912.F-IF.2.4:	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.* ★
MAFS.912.F-IF.2.5:	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble engines in a factory, then the positive integers would be an appropriate domain for the function.* ★

MAFS.912.F-IF.2.6:	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. ★
MAFS.912.F-IF.3.7:	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★ a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift.
MAFS.912.F-IF.3.8:	Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. b. Use the properties of exponents to interpret expressions for exponential functions. *For example, identify percent rate of change in functions such as* $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)^{12t}$, $y = (1.2)^{t/10}$, *and classify them as representing exponential growth or decay.*
MAFS.912.F-LE.1.3:	Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function. ★
MAFS.912.F-LE.1.4:	For exponential models, express as a logarithm the solution to ab^{ct} = d where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology. ★
MAFS.912.F-LE.2.5:	Interpret the parameters in a linear or exponential function in terms of a context. ★
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★
MAFS.912.S-IC.2.6:	Evaluate reports based on data. ★
MAFS.912.S-ID.2.6:	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. ★ a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. *Use given functions or choose a function suggested by the context. Emphasize linear, and exponential models.* b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association. **Clarifications:** Students take a more sophisticated look at using a linear function to model the relationship between two numerical variables. In addition to fitting a line to data, students assess how well the model fits by analyzing residuals.
MAFS.912.S-MD.2.5:	Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values. ★ a. Find the expected payoff for a game of chance. *For example, find the expected winnings from a state lottery ticket or a game at a fast-food restaurant.* b. Evaluate and compare strategies on the basis of expected values. *For example, compare a high-deductible versus a low-deductible automobile insurance policy using various, but reasonable, chances of having a minor or a major accident.*
MAFS.K12.MP.1.1:	**Make sense of problems and persevere in solving them.** Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
MAFS.K12.MP.2.1:	**Reason abstractly and quantitatively**. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
MAFS.K12.MP.3.1:	**Construct viable arguments and critique the reasoning of others.** Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve

	the arguments.
MAFS.K12.MP.4.1:	**Model with mathematics.** Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
MAFS.K12.MP.5.1:	**Use appropriate tools strategically.** Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
MAFS.K12.MP.6.1:	**Attend to precision.** Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
MAFS.K12.MP.7.1:	**Look for and make use of structure.** Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
MAFS.K12.MP.8.1:	**Look for and express regularity in repeated reasoning.** Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
SS.912.E.1.14:	Compare credit, savings, and investment services available to the consumer from financial institutions.
SS.912.E.1.16:	Construct a one-year budget plan for a specific career path including expenses and construction of a credit plan for purchasing a major item. **Clarifications:** Examples of a career path are university student, trade school student, food service employee, retail employee, laborer, armed forces enlisted personnel. Examples of a budget plan are housing expenses, furnishing, utilities, food costs, transportation, and personal expenses - medical, clothing, grooming, entertainment and recreation, and gifts and contributions. Examples of a credit plan are interest rates, credit scores, payment plan.
SS.912.FL.1.6:	Explain that taxes are paid to federal, state, and local governments to fund government goods and services and transfer payments from government to individuals and that the major types of taxes are income taxes, payroll (Social Security) taxes, property taxes, and sales taxes. **Clarifications:** Calculate the amount of taxes a person is likely to pay when given information or data about the person’s sources of income and amount of spending. Identify which level of government receives the tax revenue for a particular tax and describe what is done with the tax revenue.
SS.912.FL.1.7:	Discuss how people’s sources of income, amount of income, as well as the amount and type of spending affect the types and amounts of taxes paid. **Clarifications:** Investigate the tax rates on different sources of income and on different types of goods that are purchased.
SS.912.FL.3.1:	Discuss the reasons why some people have a tendency to be impatient and choose immediate spending over saving for the future. **Clarifications:** Identify instances in their lives where they decided to buy something immediately and then wished they had instead saved the money for future purchases.
	Examine the ideas that inflation reduces the value of money, including savings, that the real interest rate expresses the rate of return on savings,

SS.912.FL.3.2:	taking into account the effect of inflation and that the real interest rate is calculated as the nominal interest rate minus the rate of inflation. **Clarifications:** Explain why savers expect a higher nominal interest rate when inflation is expected to be high.
SS.912.FL.3.3:	Compare the difference between the nominal interest rate which tells savers how the dollar value of their savings or investments will grow, and the real interest rate which tells savers how the purchasing power of their savings or investments will grow. **Clarifications:** Given the nominal interest rate and the rate of inflation over the course of one year, explain what will happen to the purchasing power of savings.
SS.912.FL.3.4:	Describe ways that money received (or paid) in the future can be compared to money held today by discounting the future value based on the rate of interest. **Clarifications:** Use spreadsheet software to calculate the amount a 10-year-old would need to save today in order to pay for one year of college tuition eight years from now.
SS.912.FL.3.6:	Describe government policies that create incentives and disincentives for people to save. **Clarifications:** Explain why traditional IRAs (individual retirement accounts), Roth IRAs, and educational savings accounts provide incentives for people to save.
SS.912.FL.3.7:	Explain how employer benefit programs create incentives and disincentives to save and how an employee's decision to save can depend on how the alternatives are presented by the employer. **Clarifications:** Explain why matches of retirement savings by employers substantially change the incentives for employees to save. Explain why having employees "opt out" of savings programs results in a higher level of saving than having them "opt in."
SS.912.FL.4.1:	Discuss ways that consumers can compare the cost of credit by using the annual percentage rate (APR), initial fees charged, and fees charged for late payment or missed payments. **Clarifications:** Use the APR, initial fees, late fees, nonpayment fees, and other relevant information to compare the cost of credit from various sources for the purchase of a product.
SS.912.FL.4.2:	Discuss that banks and financial institutions sometimes compete by offering credit at low introductory rates, which increase after a set period of time or when the borrower misses a payment or makes a late payment. **Clarifications:** Explain why a bank may offer low-rate introductory credit offers.
SS.912.FL.4.4:	Describe why people often make a cash payment to the seller of a good—called a down payment—in order to reduce the amount they need to borrow. Describe why lenders may consider loans made with a down payment to have less risk because the down payment gives the borrower some equity or ownership right away and why these loans may carry a lower interest rate. **Clarifications:** Explain how a down payment reduces the total amount financed and why this reduces the monthly payment and/or the length of the loan. Explain why a borrower who has made a down payment has an incentive to repay a loan or make payments on time.
SS.912.FL.4.8:	Examine the fact that failure to repay a loan has significant consequences for borrowers such as negative entries on their credit report, repossession of property (collateral), garnishment of wages, and the inability to obtain loans in the future. **Clarifications:** Write a scenario about the future opportunities a person can lose by failing to repay loans as agreed.
SS.912.FL.4.11:	Explain that people often apply for a mortgage to purchase a home and identify a mortgage is a type of loan that is secured by real estate property as collateral. **Clarifications:** Predict what might happen should a homeowner fail to make his or her mortgage payments.
SS.912.FL.4.12:	Discuss that consumers who use credit should be aware of laws that are in place to protect them and that these include requirements to provide full disclosure of credit terms such as APR and fees, as well as protection against discrimination and abusive marketing or collection practices. **Clarifications:** Explain why it is important that consumers have full information about loans. Explain the information on a credit disclosure statement.
SS.912.FL.5.1:	Compare the ways that federal, state, and local tax rates vary on different types of investments. Describe the taxes effect on the after-tax rate of return of an investment. **Clarifications:** Given tax rates and inflation rates, calculate the real, after-tax rates of return for groups of stocks and bonds.
SS.912.FL.5.2:	Explain how the expenses of buying, selling, and holding financial assets decrease the rate of return from an investment. **Clarifications:** Identify and compare the administrative costs of several mutual funds and estimate the differences in the total amount accumulated after 10 years for each mutual fund, assuming identical market performance.
SS.912.FL.5.4:	Explain that an investment with greater risk than another investment will commonly have a lower market price, and therefore a higher rate of return, than the other investment. **Clarifications:** Explain why the expected rate of return on a "blue chip" stock is likely to be lower than that of an Internet start-up company.
SS.912.FL.5.5:	Explain that shorter-term investments will likely have lower rates of return than longer-term investments. **Clarifications:** Explain how markets will determine the rates of return for two bonds if one is a long-term bond and the other a short-term bond, assuming each bond pays the same rate of interest.
	Describe how diversifying investments in different types of financial assets can lower investment risk. **Clarifications:**

SS.912.FL.5.6:	Compare the risk faced by two investors, both of whom own two businesses on a beach. One investor owns a suntan lotion business and a rain umbrella business. The other investor owns two suntan lotion businesses. Explain why a financial advisor might encourage a client to include stocks, bonds, and real estate assets in his or her portfolio.
SS.912.FL.5.9:	Examine why investors should be aware of tendencies that people have that may result in poor choices, which may include avoiding selling assets at a loss because they weigh losses more than they weigh gains and investing in financial assets with which they are familiar, such as their own employer's stock or domestic rather than international stocks. **Clarifications:** Explain why investors may sell stocks that have gained in value, but hold ones that have lost value. Explain why this may not make sense. Identify an example of why an investor may have a bias toward familiar investments and why this may or may not be a rational decision.
SS.912.FL.6.3:	Describe why people choose different amounts of insurance coverage based on their willingness to accept risk, as well as their occupation, lifestyle, age, financial profile, and the price of insurance. **Clarifications:** Given hypothetical profiles for three types of individuals who differ with respect to occupation, age, lifestyle, marital status, and financial profile, assess the types and levels of personal financial risk faced by each and make recommendations for appropriate insurance.
SS.912.FL.6.7:	Compare the purposes of various types of insurance, including that health insurance provides for funds to pay for health care in the event of illness and may also pay for the cost of preventative care; disability insurance is income insurance that provides funds to replace income lost while an individual is ill or injured and unable to work; property and casualty insurance pays for damage or loss to the insured's property; life insurance benefits are paid to the insured's beneficiaries in the event of the policyholder's death. **Clarifications:** Compare the coverage and costs of hypothetical plans for a set of scenarios for various types of insurance.
SS.912.FL.6.9:	Explain that loss of assets, wealth, and future opportunities can occur if an individual's personal information is obtained by others through identity theft and then used fraudulently, and that by managing their personal information and choosing the environment in which it is revealed, individuals can accept, reduce, and insure against the risk of loss due to identity theft. **Clarifications:** Describe problems that can occur when an individual is a victim of identity theft. Give specific examples of how online transactions, online banking, email scams, and telemarketing calls can make consumers vulnerable to identity theft. Describe the conditions under which individuals should and should not disclose their Social Security number, account numbers, or other sensitive personal information.
LAFS.910.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
LAFS.910.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.
LAFS.910.RST.3.7:	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LAFS.910.SL.1.1:	Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed. c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions. d. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.
LAFS.910.SL.1.2:	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
LAFS.910.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.
LAFS.910.SL.2.4:	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
LAFS.910.WHST.1.1:	Write arguments focused on *discipline-specific content.* a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns. c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.910.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.910.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

General Course Information and Notes

GENERAL NOTES

This course is targeted for students who need additional instruction in content to prepare them for success in upper-level mathematics. This course incorporates the Florida Standards for Mathematical Practices as well as the following Florida Standards for Mathematical Content: Algebra, Geometry, Number and Quantity, and Statistics, and the Florida Standards for High School Modeling. The course also includes Financial Literacy Standards found in Social Studies.

Intent of the course: The financial literacy focus of this course provides a real-life framework to apply upper-level mathematics standards. In our consumer-based society, a mathematics course that addresses the results of financial decisions will result in more fiscally responsible citizens. This course will give students the opportunity to apply mathematics found in financial topics such as personal investments, retirement planning, credit card interest, and savings. Financial Algebra is designed for students who have completed Algebra 1 and Geometry. The course would be a bridge to upper-level mathematics such as Algebra 2 and Mathematics for College Readiness. Please note that the financial literacy standards in this course are repeated in the required Economics course for graduation with a standard high school diploma.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf.

GENERAL INFORMATION

Course Number: 1200387

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Mathematical Studies/Applications >

Abbreviated Title: FINANCIAL ALGEBRA

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Type: Core Academic Course

Course Level: 2

Course Status: Course Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Mathematics

Educator Certifications

Mathematics (Grades 6-12)

Mathematics for Data and Financial Literacy (#1200387) 2022 - And Beyond

Course Standards

Name	Description
MA.912.AR.1.1:	Identify and interpret parts of an equation or expression that represent a quantity in terms of a mathematical or real-world context, including viewing one or more of its parts as a single entity. **Clarifications:** *Clarification 1:* Parts of an expression include factors, terms, constants, coefficients and variables. *Clarification 2:* Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.1.2:	Rearrange equations or formulas to isolate a quantity of interest. **Clarifications:** *Clarification 1*: Instruction includes using formulas for temperature, perimeter, area and volume; using equations for linear (standard, slope-intercept and point-slope forms) and quadratic (standard, factored and vertex forms) functions. *Clarification 2*: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.2.5:	Solve and graph mathematical and real-world problems that are modeled with linear functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain, range, intercepts and rate of change. *Clarification 2*: Instruction includes the use of standard form, slope-intercept form and point-slope form. *Clarification 3*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation. *Clarification 4*: Within the Algebra 1 course, notations for domain, range and constraints are limited to inequality and set-builder. *Clarification 5*: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.5.7:	Solve and graph mathematical and real-world problems that are modeled with exponential functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; constant percent rate of change; end behavior and asymptotes. *Clarification 2*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation. *Clarification 3*: Instruction includes understanding that when the logarithm of the dependent variable is taken and graphed, the exponential function will be transformed into a linear function. *Clarification 4*: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.9.10:	Solve and graph mathematical and real-world problems that are modeled with piecewise functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain, range, intercepts, asymptotes and end behavior. *Clarification 2*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation.
MA.912.AR.10.1:	Given a mathematical or real-world context, write and solve problems involving arithmetic sequences.
MA.912.AR.10.2:	Given a mathematical or real-world context, write and solve problems involving geometric sequences.
MA.912.DP.1.2:	Interpret data distributions represented in various ways. State whether the data is numerical or categorical, whether it is univariate or bivariate and interpret the different components and quantities in the display. **Clarifications:** *Clarification 1*: Within the Probability and Statistics course, instruction includes the use of spreadsheets and technology.
MA.912.DP.2.4:	Fit a linear function to bivariate numerical data that suggests a linear association and interpret the slope and y-intercept of the model. Use the model to solve real-world problems in terms of the context of the data. **Clarifications:** *Clarification 1*: Instruction includes fitting a linear function both informally and formally with the use of technology. *Clarification 2*: Problems include making a prediction or extrapolation, inside and outside the range of the data, based on the equation of the line of fit.
MA.912.DP.3.1:	Construct a two-way frequency table summarizing bivariate categorical data. Interpret joint and marginal frequencies and determine possible associations in terms of a real-world context.
	Given marginal and conditional relative frequencies, construct a two-way relative frequency table summarizing categorical bivariate data.

MA.912.DP.3.2:	**Clarifications:** *Clarification 1:* Construction includes cases where not all frequencies are given but enough are provided to be able to construct a two-way relative frequency table. *Clarification 2:* Instruction includes the use of a tree diagram when calculating relative frequencies to construct tables.
MA.912.DP.3.3:	Given a two-way relative frequency table or segmented bar graph summarizing categorical bivariate data, interpret joint, marginal and conditional relative frequencies in terms of a real-world context. **Clarifications:** *Clarification 1:* Instruction includes problems involving false positive and false negatives.
MA.912.DP.5.11:	Evaluate reports based on data from diverse media, print and digital resources by interpreting graphs and tables; evaluating data-based arguments; determining whether a valid sampling method was used; or interpreting provided statistics. **Clarifications:** *Clarification 1*: Instruction includes determining whether or not data displays could be misleading.
MA.912.F.1.2:	Given a function represented in function notation, evaluate the function for an input in its domain. For a real-world context, interpret the output. **Clarifications:** *Clarification 1*: Problems include simple functions in two-variables, such as $f(x,y)=3x-2y$. *Clarification 2*: Within the Algebra 1 course, functions are limited to one-variable such as $f(x)=3x$.
MA.912.F.3.2:	Given a mathematical or real-world context, combine two or more functions, limited to linear, quadratic, exponential and polynomial, using arithmetic operations. When appropriate, include domain restrictions for the new function. **Clarifications:** *Clarification 1*: Instruction includes representing domain restrictions with inequality notation, interval notation or set-builder notation. *Clarification 2*: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.FL.1.1:	Extend previous knowledge of operations of fractions, percentages and decimals to solve real-world problems involving money and business. **Clarifications:** *Clarification 1*: Problems include discounts, markups, simple interest, tax, tips, fees, percent increase, percent decrease and percent error.
MA.912.FL.1.2:	Extend previous knowledge of ratios and proportional relationships to solve real-world problems involving money and business.
MA.912.FL.1.3:	Solve real-world problems involving weighted averages using spreadsheets and other technology.
MA.912.FL.2.1:	Given assets and liabilities, calculate net worth using spreadsheets and other technology. **Clarifications:** *Clarification 1*: Instruction includes net worth for a business and for an individual. *Clarification 2*: Instruction includes understanding the difference between a capital asset and a liquid asset. *Clarification 3*: Instruction includes displaying net worth over time in a table or graph.
MA.912.FL.2.2:	Solve real-world problems involving profits, costs and revenues using spreadsheets and other technology. **Clarifications:** *Clarification 1*: Instruction includes the connection to data. *Clarification 2*: Instruction includes displaying profits and costs over time in a table or graph and using the graph to predict profits. *Clarification 3*: Problems include maximizing profits, maximizing revenues and minimizing costs.
MA.912.FL.2.4:	Given current exchange rates, convert between currencies. Solve real-world problems involving exchange rates. **Clarifications:** *Clarification 1*: Instruction includes taking into account various fees, such as conversion fee, foreign transaction fee and dynamic concurrency conversion fee.
MA.912.FL.2.5:	Develop budgets that fit within various incomes using spreadsheets and other technology. **Clarifications:** *Clarification 1*: Instruction includes budgets for a business and for an individual. *Clarification 2*: Instruction includes taking into account various cash management strategies, such as checking and savings accounts, and how inflation may affect these strategies.
MA.912.FL.2.6:	Given a real-world scenario, complete and calculate federal income tax using spreadsheets and other technology. **Clarifications:** *Clarification 1*: Instruction includes understanding the difference between standardized deductions and itemized deductions. *Clarification 2*: Instruction includes the connection to piecewise linear functions with slopes relating to the marginal tax rates.
MA.912.FL.3.1:	Compare simple, compound and continuously compounded interest over time. **Clarifications:** *Clarification 1*: Instruction includes taking into consideration the annual percentage rate (APR) when comparing simple and compound interest.
MA.912.FL.3.2:	Solve real-world problems involving simple, compound and continuously compounded interest. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, interest is limited to simple and compound.
MA.912.FL.3.5:	Compare the advantages and disadvantages of using cash versus personal financing options. **Clarifications:** *Clarification 1*: Instruction includes advantages and disadvantages for a business and for an individual. *Clarification 2*: Personal financing options include debit cards, credit cards, installment plans and loans.
	Calculate the finance charges and total amount due on a bill using various forms of credit using estimation, spreadsheets and other technology.

MA.912.FL.3.6:	**Clarifications:** *Clarification 1*: Instruction includes how annual percentage rate (APR) and periodic rate are calculated per month and the connection between the two percentages.
MA.912.FL.3.7:	Compare the advantages and disadvantages of different types of student loans by manipulating a variety of variables and calculating the total cost using spreadsheets and other technology. **Clarifications:** *Clarification 1*: Instruction includes students researching the latest information on different student loan options. *Clarification 2*: Instruction includes comparing subsidized (Stafford), unsubsidized, direct unsubsidized and PLUS loans. *Clarification 3*: Instruction includes considering different repayment plans, including deferred payments and forbearance. *Clarification 4*: Instruction includes how interest on student loans may affect one's income taxes.
MA.912.FL.3.8:	Calculate using spreadsheets and other technology the total cost of purchasing consumer durables over time given different monthly payments, down payments, financing options and fees. **Clarifications:** *Clarification 1*: Instruction includes how interest on loans may affect one's income taxes.
MA.912.FL.3.9:	Compare the advantages and disadvantages of different types of mortgage loans by manipulating a variety of variables and calculating fees and total cost using spreadsheets and other technology. **Clarifications:** *Clarification 1*: Instruction includes understanding various considerations that qualify a buyer for a loan, such as Debt-to-Income ratio. *Clarification 2*: Fees include discount prices, origination fee, maximum brokerage fee on a net or gross loan, documentary stamps and prorated expenses. *Clarification 3*: Instruction includes a cost comparison between a higher interest rate and fewer mortgage points versus a lower interest rate and more mortgage points. *Clarification 4*: Instruction includes a cost comparison between the length of the mortgage loan, such as 30-year versus 15-year. Clarification 5: Instruction includes adjustable rate loans, tax implications and equity for mortgages.
MA.912.FL.3.10:	Analyze credit scores qualitatively. Explain how short-term and long-term purchases, including deferred payments, may increase or decrease credit scores. Explain how credit scores influence buying power. **Clarifications:** *Clarification 1*: Instruction includes how each of the following categories affects a credit score: past payment history, amount of debt, public records information, length of credit history and the number of recent credit inquiries. *Clarification 2*: Instruction includes how a credit score affects qualification and interest rate for a home mortgage.
MA.912.FL.3.11:	Given a real-world scenario, establish a plan to pay off debt. **Clarifications:** *Clarification 1*: Instruction includes the comparison of different plans to pay off the debt. *Clarification 2*: Instruction includes pay off plans for a business and for an individual.
MA.912.FL.4.1:	Calculate and compare various options, deductibles and fees for various types of insurance policies using spreadsheets and other technology. **Clarifications:** *Clarification 1*: Insurances include medical, car, homeowners, life and rental car. *Clarification 2*: Instruction includes types of insurance for a business and for an individual.
MA.912.FL.4.3:	Compare the advantages and disadvantages of various retirement savings plans using spreadsheets and other technology. **Clarifications:** *Clarification 1*: Instruction includes weighing options based on salary and retirement plans from different potential employers. *Clarification 2*: Instruction includes understanding the need to build one's own retirement plan when starting a business.
MA.912.FL.4.4:	Collect, organize and interpret data to determine an effective retirement savings plan to meet personal financial goals using spreadsheets and other technology. **Clarifications:** *Clarification 1*: Instruction includes students researching the latest information on different retirement options. *Clarification 2*: Instruction includes the understanding of the relationship between salaries and retirement plans. *Clarification 3*: Instruction includes retirement plans from the perspective of a business and of an individual. *Clarification 4*: Instruction includes the comparison of different types of retirement plans, including IRAs, pensions and annuities.
MA.912.FL.4.5:	Compare different ways that portfolios can be diversified in investments. **Clarifications:** *Clarification 1*: Instruction includes diversifying a portfolio with different types of stock and diversifying a portfolio by including both stocks and bonds.
MA.912.FL.4.6:	Simulate the purchase of a stock portfolio with a set amount of money, and evaluate its worth over time considering gains, losses and selling, taking into account any associated fees.
MA.912.NSO.1.1:	Extend previous understanding of the Laws of Exponents to include rational exponents. Apply the Laws of Exponents to evaluate numerical expressions and generate equivalent numerical expressions involving rational exponents. **Clarifications:** *Clarification 1:* Instruction includes the use of technology when appropriate. *Clarification 2:* Refer to the K-12 Formulas (Appendix E) for the Laws of Exponents. *Clarification 3:* Instruction includes converting between expressions involving rational exponents and expressions involving radicals.

	Clarification 4: Within the Mathematics for Data and Financial Literacy course, it is not the expectation to generate equivalent numerical expressions.
MA.912.NSO.1.2:	Generate equivalent algebraic expressions using the properties of exponents.
MA.K12.MTR.1.1:	Mathematicians who participate in effortful learning both individually and with others: • Analyze the problem in a way that makes sense given the task. • Ask questions that will help with solving the task. • Build perseverance by modifying methods as needed while solving a challenging task. • Stay engaged and maintain a positive mindset when working to solve tasks. • Help and support each other when attempting a new method or approach. **Clarifications:** Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: • Build understanding through modeling and using manipulatives. • Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. • Progress from modeling problems with objects and drawings to using algorithms and equations. • Express connections between concepts and representations. • Choose a representation based on the given context or purpose. **Clarifications:** Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations. **Clarifications:** Teachers who encourage students to complete tasks with mathematical fluency: • Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. • Offer multiple opportunities for students to practice efficient and generalizable methods. • Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: • Communicate mathematical ideas, vocabulary and methods effectively. • Analyze the mathematical thinking of others. • Compare the efficiency of a method to those expressed by others. • Recognize errors and suggest how to correctly solve the task. • Justify results by explaining methods and processes. • Construct possible arguments based on evidence. **Clarifications:** Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. **Clarifications:** Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts.

	• Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. **Clarifications:** Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems. • Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. **Clarifications:** Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. **Clarifications:** K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. **Clarifications:** See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. **Clarifications:** Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. **Clarifications:** In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think _______ because ______." The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. **Clarifications:** Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. **Clarifications:** In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

General Course Information and Notes

VERSION DESCRIPTION

In Mathematics for Data and Financial Literacy, instructional time will emphasize five areas: (1) extending knowledge of ratios, proportions and functions to data and financial contexts; (2) developing understanding of basic economic and accounting principles; (3) determining advantages and disadvantages of credit accounts and short- and long-term loans; (4) developing understanding of planning for the future through investments, insurance and retirement plans and (5) extending knowledge of data analysis to create and evaluate reports and to make predictions.

All clarifications stated, whether general or specific to Mathematics for Data and Financial Literacy, are expectations for instruction of that benchmark.

Curricular content for all subjects must integrate critical-thinking, problem-solving, and workforce-literacy skills; communication, reading, and writing skills; mathematics skills; collaboration skills; contextual and applied-learning skills; technology-literacy skills; information and media-literacy skills; and civic-engagement skills.

GENERAL NOTES

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards:

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Number: 1200387

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Mathematical Studies/Applications >

Abbreviated Title: MATH DATA & FIN LIT

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- Class Size Core Required

Course Type: Core Academic Course

Course Level: 2

Course Status: State Board Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Mathematics

Educator Certifications

Mathematics (Grades 6-12)

Mathematics for Data and Financial Literacy Honors (#1200388) 2022 - And Beyond (current)

Course Standards

Name	Description
MA.912.AR.1.1:	Identify and interpret parts of an equation or expression that represent a quantity in terms of a mathematical or real-world context, including viewing one or more of its parts as a single entity. **Clarifications:** *Clarification 1:* Parts of an expression include factors, terms, constants, coefficients and variables. *Clarification 2:* Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.1.2:	Rearrange equations or formulas to isolate a quantity of interest. **Clarifications:** *Clarification 1*: Instruction includes using formulas for temperature, perimeter, area and volume; using equations for linear (standard, slope-intercept and point-slope forms) and quadratic (standard, factored and vertex forms) functions. *Clarification 2*: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.2.5:	Solve and graph mathematical and real-world problems that are modeled with linear functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain, range, intercepts and rate of change. *Clarification 2*: Instruction includes the use of standard form, slope-intercept form and point-slope form. *Clarification 3*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation. *Clarification 4*: Within the Algebra 1 course, notations for domain, range and constraints are limited to inequality and set-builder. *Clarification 5*: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.3.8:	Solve and graph mathematical and real-world problems that are modeled with quadratic functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior; vertex; and symmetry. *Clarification 2*: Instruction includes the use of standard form, factored form and vertex form. *Clarification 3*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation. *Clarification 4*: Within the Algebra 1 course, notations for domain, range and constraints are limited to inequality and set-builder.
MA.912.AR.5.7:	Solve and graph mathematical and real-world problems that are modeled with exponential functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; constant percent rate of change; end behavior and asymptotes. *Clarification 2*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation. *Clarification 3*: Instruction includes understanding that when the logarithm of the dependent variable is taken and graphed, the exponential function will be transformed into a linear function. *Clarification 4*: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.9.10:	Solve and graph mathematical and real-world problems that are modeled with piecewise functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain, range, intercepts, asymptotes and end behavior. *Clarification 2*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation.
MA.912.AR.10.1:	Given a mathematical or real-world context, write and solve problems involving arithmetic sequences.
MA.912.AR.10.2:	Given a mathematical or real-world context, write and solve problems involving geometric sequences.
MA.912.DP.1.2:	Interpret data distributions represented in various ways. State whether the data is numerical or categorical, whether it is univariate or bivariate and interpret the different components and quantities in the display. **Clarifications:** *Clarification 1*: Within the Probability and Statistics course, instruction includes the use of spreadsheets and technology.

MA.912.DP.2.4:	Fit a linear function to bivariate numerical data that suggests a linear association and interpret the slope and y-intercept of the model. Use the model to solve real-world problems in terms of the context of the data. **Clarifications:** *Clarification 1*: Instruction includes fitting a linear function both informally and formally with the use of technology. *Clarification 2*: Problems include making a prediction or extrapolation, inside and outside the range of the data, based on the equation of the line of fit.
MA.912.DP.2.8:	Fit a quadratic function to bivariate numerical data that suggests a quadratic association and interpret any intercepts or the vertex of the model. Use the model to solve real-world problems in terms of the context of the data. **Clarifications:** *Clarification 1*: Problems include making a prediction or extrapolation, inside and outside the range of the data, based on the equation of the line of fit.
MA.912.DP.2.9:	Fit an exponential function to bivariate numerical data that suggests an exponential association. Use the model to solve real-world problems in terms of the context of the data. **Clarifications:** *Clarification 1*: Instruction focuses on determining whether an exponential model is appropriate by taking the logarithm of the dependent variable using spreadsheets and other technology. *Clarification 2*: Instruction includes determining whether the transformed scatterplot has an appropriate line of best fit, and interpreting the y-intercept and slope of the line of best fit. *Clarification 3*: Problems include making a prediction or extrapolation, inside and outside the range of the data, based on the equation of the line of fit.
MA.912.DP.3.1:	Construct a two-way frequency table summarizing bivariate categorical data. Interpret joint and marginal frequencies and determine possible associations in terms of a real-world context.
MA.912.DP.3.2:	Given marginal and conditional relative frequencies, construct a two-way relative frequency table summarizing categorical bivariate data. **Clarifications:** *Clarification 1:* Construction includes cases where not all frequencies are given but enough are provided to be able to construct a two-way relative frequency table. *Clarification 2:* Instruction includes the use of a tree diagram when calculating relative frequencies to construct tables.
MA.912.DP.3.3:	Given a two-way relative frequency table or segmented bar graph summarizing categorical bivariate data, interpret joint, marginal and conditional relative frequencies in terms of a real-world context. **Clarifications:** *Clarification 1:* Instruction includes problems involving false positive and false negatives.
MA.912.DP.3.4:	Given a relative frequency table, construct and interpret a segmented bar graph.
MA.912.DP.5.11:	Evaluate reports based on data from diverse media, print and digital resources by interpreting graphs and tables; evaluating data-based arguments; determining whether a valid sampling method was used; or interpreting provided statistics. **Clarifications:** *Clarification 1*: Instruction includes determining whether or not data displays could be misleading.
MA.912.F.1.2:	Given a function represented in function notation, evaluate the function for an input in its domain. For a real-world context, interpret the output. **Clarifications:** *Clarification 1*: Problems include simple functions in two-variables, such as $f(x,y)=3x-2y$. *Clarification 2*: Within the Algebra 1 course, functions are limited to one-variable such as $f(x)=3x$.
MA.912.F.3.2:	Given a mathematical or real-world context, combine two or more functions, limited to linear, quadratic, exponential and polynomial, using arithmetic operations. When appropriate, include domain restrictions for the new function. **Clarifications:** *Clarification 1*: Instruction includes representing domain restrictions with inequality notation, interval notation or set-builder notation. *Clarification 2*: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.FL.1.1:	Extend previous knowledge of operations of fractions, percentages and decimals to solve real-world problems involving money and business. **Clarifications:** *Clarification 1*: Problems include discounts, markups, simple interest, tax, tips, fees, percent increase, percent decrease and percent error.
MA.912.FL.1.2:	Extend previous knowledge of ratios and proportional relationships to solve real-world problems involving money and business.
MA.912.FL.1.3:	Solve real-world problems involving weighted averages using spreadsheets and other technology.
MA.912.FL.2.1:	Given assets and liabilities, calculate net worth using spreadsheets and other technology. **Clarifications:** *Clarification 1*: Instruction includes net worth for a business and for an individual. *Clarification 2*: Instruction includes understanding the difference between a capital asset and a liquid asset. *Clarification 3*: Instruction includes displaying net worth over time in a table or graph.
MA.912.FL.2.2:	Solve real-world problems involving profits, costs and revenues using spreadsheets and other technology. **Clarifications:** *Clarification 1*: Instruction includes the connection to data. *Clarification 2*: Instruction includes displaying profits and costs over time in a table or graph and using the graph to predict profits. *Clarification 3*: Problems include maximizing profits, maximizing revenues and minimizing costs.
	Explain how consumer price index (CPI), gross domestic product (GDP), stock indices, unemployment rate and trade deficit are calculated. Interpret

MA.912.FL.2.3:	their value in terms of the context. **Clarifications:** *Clarification 1*: Instruction includes the understanding that quantities are based on data and may include measurement error.
MA.912.FL.2.4:	Given current exchange rates, convert between currencies. Solve real-world problems involving exchange rates. **Clarifications:** *Clarification 1*: Instruction includes taking into account various fees, such as conversion fee, foreign transaction fee and dynamic concurrency conversion fee.
MA.912.FL.2.5:	Develop budgets that fit within various incomes using spreadsheets and other technology. **Clarifications:** *Clarification 1*: Instruction includes budgets for a business and for an individual. *Clarification 2*: Instruction includes taking into account various cash management strategies, such as checking and savings accounts, and how inflation may affect these strategies.
MA.912.FL.2.6:	Given a real-world scenario, complete and calculate federal income tax using spreadsheets and other technology. **Clarifications:** *Clarification 1*: Instruction includes understanding the difference between standardized deductions and itemized deductions. *Clarification 2*: Instruction includes the connection to piecewise linear functions with slopes relating to the marginal tax rates.
MA.912.FL.3.1:	Compare simple, compound and continuously compounded interest over time. **Clarifications:** *Clarification 1*: Instruction includes taking into consideration the annual percentage rate (APR) when comparing simple and compound interest.
MA.912.FL.3.2:	Solve real-world problems involving simple, compound and continuously compounded interest. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, interest is limited to simple and compound.
MA.912.FL.3.3:	Solve real-world problems involving present value and future value of money
MA.912.FL.3.5:	Compare the advantages and disadvantages of using cash versus personal financing options. **Clarifications:** *Clarification 1*: Instruction includes advantages and disadvantages for a business and for an individual. *Clarification 2*: Personal financing options include debit cards, credit cards, installment plans and loans.
MA.912.FL.3.6:	Calculate the finance charges and total amount due on a bill using various forms of credit using estimation, spreadsheets and other technology. **Clarifications:** *Clarification 1*: Instruction includes how annual percentage rate (APR) and periodic rate are calculated per month and the connection between the two percentages.
MA.912.FL.3.7:	Compare the advantages and disadvantages of different types of student loans by manipulating a variety of variables and calculating the total cost using spreadsheets and other technology. **Clarifications:** *Clarification 1*: Instruction includes students researching the latest information on different student loan options. *Clarification 2*: Instruction includes comparing subsidized (Stafford), unsubsidized, direct unsubsidized and PLUS loans. *Clarification 3*: Instruction includes considering different repayment plans, including deferred payments and forbearance. *Clarification 4*: Instruction includes how interest on student loans may affect one's income taxes.
MA.912.FL.3.8:	Calculate using spreadsheets and other technology the total cost of purchasing consumer durables over time given different monthly payments, down payments, financing options and fees. **Clarifications:** *Clarification 1*: Instruction includes how interest on loans may affect one's income taxes.
MA.912.FL.3.9:	Compare the advantages and disadvantages of different types of mortgage loans by manipulating a variety of variables and calculating fees and total cost using spreadsheets and other technology. **Clarifications:** *Clarification 1*: Instruction includes understanding various considerations that qualify a buyer for a loan, such as Debt-to-Income ratio. *Clarification 2*: Fees include discount prices, origination fee, maximum brokerage fee on a net or gross loan, documentary stamps and prorated expenses. *Clarification 3*: Instruction includes a cost comparison between a higher interest rate and fewer mortgage points versus a lower interest rate and more mortgage points. *Clarification 4*: Instruction includes a cost comparison between the length of the mortgage loan, such as 30-year versus 15-year. Clarification 5: Instruction includes adjustable rate loans, tax implications and equity for mortgages.
MA.912.FL.3.10:	Analyze credit scores qualitatively. Explain how short-term and long-term purchases, including deferred payments, may increase or decrease credit scores. Explain how credit scores influence buying power. **Clarifications:** *Clarification 1*: Instruction includes how each of the following categories affects a credit score: past payment history, amount of debt, public records information, length of credit history and the number of recent credit inquiries. *Clarification 2*: Instruction includes how a credit score affects qualification and interest rate for a home mortgage.
MA.912.FL.3.11:	Given a real-world scenario, establish a plan to pay off debt. **Clarifications:** *Clarification 1*: Instruction includes the comparison of different plans to pay off the debt. *Clarification 2*: Instruction includes pay off plans for a business and for an individual.

MA.912.FL.4.1:	Calculate and compare various options, deductibles and fees for various types of insurance policies using spreadsheets and other technology. **Clarifications:** *Clarification 1*: Insurances include medical, car, homeowners, life and rental car. *Clarification 2*: Instruction includes types of insurance for a business and for an individual.
MA.912.FL.4.2:	Compare the advantages and disadvantages for adding on a one-time warranty to a purchase using spreadsheets and other technology. **Clarifications:** *Clarification 1*: Warranties include protection plans from stores, car warranty and home protection plans. *Clarification 2*: Instruction includes types of warranties for a business and for an individual. *Clarification 3*: Instruction includes taking into consideration the risk of utilizing or not utilizing a one-time warranty on one or multiple purchases.
MA.912.FL.4.3:	Compare the advantages and disadvantages of various retirement savings plans using spreadsheets and other technology. **Clarifications:** *Clarification 1*: Instruction includes weighing options based on salary and retirement plans from different potential employers. *Clarification 2*: Instruction includes understanding the need to build one's own retirement plan when starting a business.
MA.912.FL.4.4:	Collect, organize and interpret data to determine an effective retirement savings plan to meet personal financial goals using spreadsheets and other technology. **Clarifications:** *Clarification 1*: Instruction includes students researching the latest information on different retirement options. *Clarification 2*: Instruction includes the understanding of the relationship between salaries and retirement plans. *Clarification 3*: Instruction includes retirement plans from the perspective of a business and of an individual. *Clarification 4*: Instruction includes the comparison of different types of retirement plans, including IRAs, pensions and annuities.
MA.912.FL.4.5:	Compare different ways that portfolios can be diversified in investments. **Clarifications:** *Clarification 1*: Instruction includes diversifying a portfolio with different types of stock and diversifying a portfolio by including both stocks and bonds.
MA.912.FL.4.6:	Simulate the purchase of a stock portfolio with a set amount of money, and evaluate its worth over time considering gains, losses and selling, taking into account any associated fees.
MA.912.NSO.1.1:	Extend previous understanding of the Laws of Exponents to include rational exponents. Apply the Laws of Exponents to evaluate numerical expressions and generate equivalent numerical expressions involving rational exponents. **Clarifications:** *Clarification 1:* Instruction includes the use of technology when appropriate. *Clarification 2:* Refer to the K-12 Formulas (Appendix E) for the Laws of Exponents. *Clarification 3:* Instruction includes converting between expressions involving rational exponents and expressions involving radicals. *Clarification 4:*Within the Mathematics for Data and Financial Literacy course, it is not the expectation to generate equivalent numerical expressions.
MA.912.NSO.1.2:	Generate equivalent algebraic expressions using the properties of exponents.
MA.912.NSO.1.6:	Given a numerical logarithmic expression, evaluate and generate equivalent numerical expressions using the properties of logarithms or exponents. **Clarifications:** *Clarification 1*: Within the Mathematics for Data and Financial Literacy Honors course, problem types focus on money and business.
MA.912.NSO.1.7:	Given an algebraic logarithmic expression, generate an equivalent algebraic expression using the properties of logarithms or exponents. **Clarifications:** *Clarification 1*: Within the Mathematics for Data and Financial Literacy Honors course, problem types focus on money and business.
MA.K12.MTR.1.1:	Mathematicians who participate in effortful learning both individually and with others: • Analyze the problem in a way that makes sense given the task. • Ask questions that will help with solving the task. • Build perseverance by modifying methods as needed while solving a challenging task. • Stay engaged and maintain a positive mindset when working to solve tasks. • Help and support each other when attempting a new method or approach. **Clarifications:** Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: • Build understanding through modeling and using manipulatives. • Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. • Progress from modeling problems with objects and drawings to using algorithms and equations. • Express connections between concepts and representations. • Choose a representation based on the given context or purpose.

	Clarifications: Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations. **Clarifications:** Teachers who encourage students to complete tasks with mathematical fluency: • Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. • Offer multiple opportunities for students to practice efficient and generalizable methods. • Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: • Communicate mathematical ideas, vocabulary and methods effectively. • Analyze the mathematical thinking of others. • Compare the efficiency of a method to those expressed by others. • Recognize errors and suggest how to correctly solve the task. • Justify results by explaining methods and processes. • Construct possible arguments based on evidence. **Clarifications:** Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. **Clarifications:** Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. **Clarifications:** Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems. • Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or

MA.K12.MTR.7.1:	efficiency. **Clarifications:** Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. **Clarifications:** K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. **Clarifications:** See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. **Clarifications:** Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. **Clarifications:** In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think _______ because ______." The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. **Clarifications:** Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. **Clarifications:** In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

General Course Information and Notes

VERSION DESCRIPTION

In Mathematics for Data and Financial Literacy Honors, instructional time will emphasize five areas: (1) extending knowledge of ratios, proportions and functions to data and financial contexts; (2) developing understanding of basic economic and accounting principles; (3) determining advantages and disadvantages of credit accounts and short- and long-term loans; (4) developing understanding of planning for the future through investments, insurance and retirement plans and (5) extending knowledge of data analysis to create and evaluate reports and to make predictions.

All clarifications stated, whether general or specific to Mathematics for Data and Financial Literacy Honors, are expectations for instruction of that benchmark.

Curricular content for all subjects must integrate critical-thinking, problem-solving, and workforce-literacy skills; communication, reading, and writing skills; mathematics skills; collaboration skills; contextual and applied-learning skills; technology-literacy skills; information and media-literacy skills; and civic-engagement skills.

GENERAL NOTES

Honors and Accelerated Level Course Note: Accelerated courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards
This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Number: 1200388

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Mathematical Studies/Applications >

Abbreviated Title: MATH DATA & FIN LIT H

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- Honors
- Class Size Core Required

Course Type: Core Academic Course

Course Level: 3

Course Status: State Board Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Mathematics

Educator Certifications

Mathematics (Grades 6-12)

International Baccalaureate Mid Yrs Prog Algebra 1 (#1200390) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The curriculum description for this IB course is provided at http://www.ibo.org/en/programmes/.

GENERAL INFORMATION

Course Number: 1200390

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Algebra >

Abbreviated Title: IB MYP ALG 1

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- International Baccalaureate (IB)

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Algebra 1

Educator Certifications

Middle Grades Mathematics (Middle Grades 5-9)
Mathematics (Grades 6-12)

Equivalent Courses

1200310-Algebra 1 Equivalency start year: 2014
1200386-Pre-Advanced Placement Algebra 1 Equivalency start year: 2018

International Baccalaureate Mid Yrs Prog Algebra 2 (#1200395) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The curriculum description for this IB course is provided at http://www.ibo.org/en/programmes/.

GENERAL INFORMATION

Course Number: 1200395

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Algebra >

Abbreviated Title: IB MYP ALG 2

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- International Baccalaureate (IB)

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Mathematics

Educator Certifications

Middle Grades Mathematics (Middle Grades 5-9)
Mathematics (Grades 6-12)

Intensive Mathematics (#1200400) 2015 - 2022 (current)

Course Standards

Name	Description
MAFS.912.A-APR.1.1:	Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. **Clarifications:** **Algebra 1 - Fluency Recommendations** Fluency in adding, subtracting, and multiplying polynomials supports students throughout their work in algebra, as well as in their symbolic work with functions. Manipulation can be more mindful when it is fluent.
MAFS.912.A-APR.2.3:	Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.
MAFS.912.A-CED.1.1:	Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational, absolute, and exponential functions. ★
MAFS.912.A-CED.1.2:	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. ★
MAFS.912.A-CED.1.3:	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.* ★
MAFS.912.A-CED.1.4:	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law V = IR to highlight resistance R.* ★
MAFS.912.A-REI.1.1:	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
MAFS.912.A-REI.2.3:	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
MAFS.912.A-REI.2.4:	Solve quadratic equations in one variable. a. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x – p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form. b. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.
MAFS.912.A-REI.3.5:	Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.
MAFS.912.A-REI.3.6:	Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
MAFS.912.A-REI.4.10:	Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).
MAFS.912.A-REI.4.11:	Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. ★
MAFS.912.A-REI.4.12:	Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.
MAFS.912.A-SSE.1.1:	Interpret expressions that represent a quantity in terms of its context. ★ a. Interpret parts of an expression, such as terms, factors, and coefficients. b. Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret as the product of P and a factor not depending on P.*
MAFS.912.A-SSE.1.2:	Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 - y^4$ as $(x^2)^2 – (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 – y^2)(x^2 + y^2)$.*
MAFS.912.A-SSE.2.3:	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.★ a. Factor a quadratic expression to reveal the zeros of the function it defines. b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. c. Use the properties of exponents to transform expressions for exponential functions. *For example the expression* 1.15^t *can be rewritten as* $(1.15^{1/12})^{12t} \approx 1.012^{12t}$ *to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.*
MAFS.912.F-BF.1.1:	Write a function that describes a relationship between two quantities. ★ a. Determine an explicit expression, a recursive process, or steps for calculation from a context. b. Combine standard function types using arithmetic operations. *For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.* c. Compose functions. *For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time.*

MAFS.912.F-BF.2.3:	Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. *Include recognizing even and odd functions from their graphs and algebraic expressions for them.*
MAFS.912.F-IF.1.1:	Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input x. The graph of f is the graph of the equation y = f(x).
MAFS.912.F-IF.1.2:	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
MAFS.912.F-IF.1.3:	Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by f(0) = f(1) = 1, f(n+1) = f(n) + f(n-1) for n ≥ 1.
MAFS.912.F-IF.2.4:	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.* ★
MAFS.912.F-IF.2.5:	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble engines in a factory, then the positive integers would be an appropriate domain for the function.* ★
MAFS.912.F-IF.2.6:	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. ★
MAFS.912.F-IF.3.8:	Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. b. Use the properties of exponents to interpret expressions for exponential functions. *For example, identify percent rate of change in functions such as* $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)^{12t}$, $y = (1.2)^{t/10}$, *and classify them as representing exponential growth or decay.*
MAFS.912.F-IF.3.9:	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.*
MAFS.912.F-LE.1.1:	Distinguish between situations that can be modeled with linear functions and with exponential functions. ★ a. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
MAFS.912.F-LE.1.2:	Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table). ★
MAFS.912.F-LE.1.3:	Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function. ★
MAFS.912.F-LE.2.5:	Interpret the parameters in a linear or exponential function in terms of a context. ★
MAFS.912.G-C.1.1:	Prove that all circles are similar.
MAFS.912.G-C.1.2:	Identify and describe relationships among inscribed angles, radii, and chords. *Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.*
MAFS.912.G-C.1.3:	Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.
MAFS.912.G-C.2.5:	Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.
MAFS.912.G-CO.1.1:	Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.
MAFS.912.G-CO.1.2:	Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).
MAFS.912.G-CO.1.3:	Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.
MAFS.912.G-CO.1.4:	Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.
MAFS.912.G-CO.1.5:	Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.
MAFS.912.G-CO.2.6:	Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.
MAFS.912.G-CO.2.7:	Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.
MAFS.912.G-CO.2.8:	Explain how the criteria for triangle congruence (ASA, SAS, SSS, and Hypotenuse-Leg) follow from the definition of congruence in terms of rigid motions.
MAFS.912.G-CO.3.9:	Prove theorems about lines and angles; use theorems about lines and angles to solve problems. *Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.*
MAFS.912.G-CO.3.10:	Prove theorems about triangles; use theorems about triangles to solve problems. *Theorems include: measures of interior angles of a triangle sum to 180°; triangle inequality theorem; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.*
MAFS.912.G-CO.3.11:	Prove theorems about parallelograms; use theorems about parallelograms to solve problems. *Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.*
MAFS.912.G-CO.4.12:	Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). *Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.* **Clarifications:** **Geometry - Fluency Recommendations**

	Fluency with the use of construction tools, physical and computational, helps students draft a model of a geometric phenomenon and can lead to conjectures and proofs.
MAFS.912.G-CO.4.13:	Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.
MAFS.912.G-GMD.1.1:	Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. *Use dissection arguments, Cavalieri's principle, and informal limit arguments.*
MAFS.912.G-GMD.1.3:	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. ★
MAFS.912.G-GMD.2.4:	Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.
MAFS.912.G-GPE.1.1:	Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.
MAFS.912.G-GPE.2.4:	Use coordinates to prove simple geometric theorems algebraically. *For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point (1, √3) lies on the circle centered at the origin and containing the point (0, 2).* **Clarifications:** **Geometry - Fluency Recommendations** Fluency with the use of coordinates to establish geometric results, calculate length and angle, and use geometric representations as a modeling tool are some of the most valuable tools in mathematics and related fields.
MAFS.912.G-GPE.2.5:	Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point). **Clarifications:** **Geometry - Fluency Recommendations** Fluency with the use of coordinates to establish geometric results, calculate length and angle, and use geometric representations as a modeling tool are some of the most valuable tools in mathematics and related fields.
MAFS.912.G-GPE.2.6:	Find the point on a directed line segment between two given points that partitions the segment in a given ratio.
MAFS.912.G-GPE.2.7:	Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula. ★ **Clarifications:** **Geometry - Fluency Recommendations** Fluency with the use of coordinates to establish geometric results, calculate length and angle, and use geometric representations as a modeling tool are some of the most valuable tools in mathematics and related fields.
MAFS.912.G-MG.1.1:	Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder). ★
MAFS.912.G-MG.1.2:	Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★
MAFS.912.G-MG.1.3:	Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios). ★
MAFS.912.G-SRT.1.1:	Verify experimentally the properties of dilations given by a center and a scale factor: a. A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged. b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor.
MAFS.912.G-SRT.1.2:	Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.
MAFS.912.G-SRT.1.3:	Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.
MAFS.912.G-SRT.2.4:	Prove theorems about triangles. *Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity.*
MAFS.912.G-SRT.2.5:	Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. **Clarifications:** **Geometry - Fluency Recommendations** Fluency with the triangle congruence and similarity criteria will help students throughout their investigations of triangles, quadrilaterals, circles, parallelism, and trigonometric ratios. These criteria are necessary tools in many geometric modeling tasks.
MAFS.912.G-SRT.3.6:	Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.
MAFS.912.G-SRT.3.7:	Explain and use the relationship between the sine and cosine of complementary angles.
MAFS.912.G-SRT.3.8:	Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. ★
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★
MAFS.912.N-Q.1.2:	Define appropriate quantities for the purpose of descriptive modeling. ★ **Clarifications:** **Algebra 1 Content Notes:** Working with quantities and the relationships between them provides grounding for work with expressions, equations, and functions.
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★
MAFS.912.N-RN.1.1:	Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. *For example, we define* $5^{1/3}$ *to be the cube root of 5 because we want* $(5^{1/3})^3 = 5^{(1/3)3}$ *to hold, so* $(5^{1/3})^3$ *must equal 5.*

MAFS.912.N-RN.1.2:	Rewrite expressions involving radicals and rational exponents using the properties of exponents.
MAFS.912.N-RN.2.3:	Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.
MAFS.912.S-ID.1.1:	Represent data with plots on the real number line (dot plots, histograms, and box plots). ★ **Clarifications:** In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.2:	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. ★ **Clarifications:** In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.3:	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). ★ **Clarifications:** In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.2.5:	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. ★
MAFS.912.S-ID.2.6:	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. ★ a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. *Use given functions or choose a function suggested by the context. Emphasize linear, and exponential models.* b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association. **Clarifications:** Students take a more sophisticated look at using a linear function to model the relationship between two numerical variables. In addition to fitting a line to data, students assess how well the model fits by analyzing residuals.
MAFS.912.S-ID.3.7:	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. ★
MAFS.912.S-ID.3.8:	Compute (using technology) and interpret the correlation coefficient of a linear fit. ★
MAFS.912.S-ID.3.9:	Distinguish between correlation and causation. ★
MAFS.K12.MP.1.1:	**Make sense of problems and persevere in solving them.** Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
MAFS.K12.MP.2.1:	**Reason abstractly and quantitatively**. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
MAFS.K12.MP.3.1:	**Construct viable arguments and critique the reasoning of others.** Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
MAFS.K12.MP.4.1:	**Model with mathematics.** Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical

	results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
MAFS.K12.MP.5.1:	**Use appropriate tools strategically.** Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
MAFS.K12.MP.6.1:	**Attend to precision.** Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
MAFS.K12.MP.7.1:	**Look for and make use of structure.** Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
MAFS.K12.MP.8.1:	**Look for and express regularity in repeated reasoning.** Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
LAFS.910.RL.1.3:	Analyze how complex characters (e.g., those with multiple or conflicting motivations) develop over the course of a text, interact with other characters, and advance the plot or develop the theme.
LAFS.910.RL.2.4:	Determine the meaning of words and phrases as they are used in the text, including figurative and connotative meanings; analyze the cumulative impact of specific word choices on meaning and tone (e.g., how the language evokes a sense of time and place; how it sets a formal or informal tone).
LAFS.910.RL.3.7:	Analyze the representation of a subject or a key scene in two different artistic mediums, including what is emphasized or absent in each treatment (e.g., Auden's "Musée des Beaux Arts" and Breughel's Landscape with the Fall of Icarus).
LAFS.910.SL.1.1:	Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed. c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions. d. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.
LAFS.910.SL.1.2:	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
LAFS.910.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.
LAFS.910.SL.2.4:	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
LAFS.910.WHST.1.1:	Write arguments focused on *discipline-specific content.* a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns. c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.910.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.910.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

GENERAL NOTES

Intensive courses have been designed so that the teacher will select the appropriate standards when developing curricula tailored to meet the needs of individual students, taking into account their grade and instructional level. This course should not be used in place of a core mathematics course but is intended to provide intervention for students who require extra mathematics instruction.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:
https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

Additional Instructional Resources:
A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGI/cms/review.html?Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

Course Number: 1200400

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Remedial >

Abbreviated Title: INTENS MATH

Course Length: Multiple (M) - Course length can vary

Course Type: Elective Course

Course Level: 1

Course Status: Course Approved

Grade Level(s): 9,10,11,12

Educator Certifications

Middle Grades Mathematics (Middle Grades 5-9)
Mathematics (Grades 6-12)

Foundational Skills in Mathematics 9-12 (#1200400) 2022 - And Beyond

Course Standards

Name	Description
MA.4.NSO.2.1:	Recall multiplication facts with factors up to 12 and related division facts with automaticity.
MA.5.GR.1.1:	Classify triangles or quadrilaterals into different categories based on shared defining attributes. Explain why a triangle or quadrilateral would or would not belong to a category. **Clarifications:** *Clarification 1:* Triangles include scalene, isosceles, equilateral, acute, obtuse and right; quadrilaterals include parallelograms, rhombi, rectangles, squares and trapezoids.
MA.5.GR.1.2:	Identify and classify three-dimensional figures into categories based on their defining attributes. Figures are limited to right pyramids, right prisms, right circular cylinders, right circular cones and spheres. **Clarifications:** *Clarification 1:* Defining attributes include the number and shape of faces, number and shape of bases, whether or not there is an apex, curved or straight edges and curved or flat faces.
MA.5.GR.2.1:	Find the perimeter and area of a rectangle with fractional or decimal side lengths using visual models and formulas. **Clarifications:** *Clarification 1:* Instruction includes finding the area of a rectangle with fractional side lengths by tiling it with squares having unit fraction side lengths and showing that the area is the same as would be found by multiplying the side lengths. *Clarification 2:* Responses include the appropriate units in word form.
MA.6.AR.1.3:	Evaluate algebraic expressions using substitution and order of operations. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is to perform all operations with integers. *Clarification 2:* Refer to Properties of Operations, Equality and Inequality (Appendix D).
MA.6.AR.3.5:	Solve mathematical and real-world problems involving ratios, rates and unit rates, including comparisons, mixtures, ratios of lengths and conversions within the same measurement system. **Clarifications:** *Clarification 1:* Instruction includes the use of tables, tape diagrams and number lines.
MA.6.DP.1.2:	Given a numerical data set within a real-world context, find and interpret mean, median, mode and range. **Clarifications:** *Clarification 1:* Numerical data is limited to positive rational numbers.
MA.6.GR.1.3:	Solve mathematical and real-world problems by plotting points on a coordinate plane, including finding the perimeter or area of a rectangle. **Clarifications:** *Clarification 1:* Instruction includes finding distances between points, computing dimensions of a rectangle or determining a fourth vertex of a rectangle. *Clarification 2:* Problems involving rectangles are limited to cases where the sides are parallel to the axes.
MA.6.GR.2.2:	Solve mathematical and real-world problems involving the area of quadrilaterals and composite figures by decomposing them into triangles or rectangles. **Clarifications:** *Clarification 1:* Problem types include finding area of composite shapes and determining missing dimensions. *Clarification 2:* Within this benchmark, the expectation is to know from memory a formula for the area of a rectangle and triangle. *Clarification 3:* Dimensions are limited to positive rational numbers.
MA.6.NSO.1.1:	Extend previous understanding of numbers to define rational numbers. Plot, order and compare rational numbers. **Clarifications:** *Clarification 1:* Within this benchmark, the expectation is to plot, order and compare positive and negative rational numbers when given in the same form and to plot, order and compare positive rational numbers when given in different forms (fraction, decimal, percentage). *Clarification 2:* Within this benchmark, the expectation is to use symbols (<, > or =).
MA.6.NSO.4.1:	Apply and extend previous understandings of operations with whole numbers to add and subtract integers with procedural fluency. **Clarifications:** *Clarification 1:* Instruction begins with the use of manipulatives, models and number lines working towards becoming procedurally fluent by the end of grade 6. *Clarification 2:* Instruction focuses on the inverse relationship between the operations of addition and subtraction. If p and q are integers, then p-q=p+(-q) and p+q=p-(-q).
	Apply and extend previous understandings of operations with whole numbers to multiply and divide integers with procedural fluency.

MA.6.NSO.4.2:	**Clarifications:** *Clarification 1:* Instruction includes the use of models and number lines and the inverse relationship between multiplication and division, working towards becoming procedurally fluent by the end of grade 6. *Clarification 2:* Instruction focuses on the understanding that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers where q≠0, then $-\left(\frac{p}{q}\right)=\frac{-p}{q}$, $-\left(\frac{p}{q}\right)=\frac{p}{-q}$ and $\frac{p}{q}=\frac{-p}{-q}$.
MA.7.AR.3.3:	Solve mathematical and real-world problems involving the conversion of units across different measurement systems.
MA.7.AR.4.5:	Solve real-world problems involving proportional relationships.
MA.7.DP.1.2:	Given two numerical or graphical representations of data, use the measure(s) of center and measure(s) of variability to make comparisons, interpret results and draw conclusions about the two populations. **Clarifications:** *Clarification 1:* Graphical representations are limited to histograms, line plots, box plots and stem-and-leaf plots. *Clarification 2:* The measure of center is limited to mean and median. The measure of variation is limited to range and interquartile range.
MA.7.DP.1.5:	Given a real-world numerical or categorical data set, choose and create an appropriate graphical representation. **Clarifications:** *Clarification 1:* Graphical representations are limited to histograms, bar charts, circle graphs, line plots, box plots and stem-and-leaf plots.
MA.7.DP.2.4:	Use a simulation of a simple experiment to find experimental probabilities and compare them to theoretical probabilities. **Clarifications:** *Clarification 1:* Instruction includes representing probability as a fraction, percentage or decimal. *Clarification 2:* Instruction includes recognizing that experimental probabilities may differ from theoretical probabilities due to random variation. As the number of repetitions increases experimental probabilities will typically better approximate the theoretical probabilities. *Clarification 3:* Experiments include tossing a fair coin, rolling a fair die, picking a card randomly from a deck, picking marbles randomly from a bag and spinning a fair spinner.
MA.7.NSO.1.2:	Rewrite rational numbers in different but equivalent forms including fractions, mixed numbers, repeating decimals and percentages to solve mathematical and real-world problems.
MA.7.NSO.2.2:	Add, subtract, multiply and divide rational numbers with procedural fluency.
MA.7.NSO.2.3:	Solve real-world problems involving any of the four operations with rational numbers. **Clarifications:** *Clarification 1:* Instruction includes using one or more operations to solve problems.
MA.8.AR.1.2:	Apply properties of operations to multiply two linear expressions with rational coefficients. **Clarifications:** *Clarification 1:* Problems are limited to products where at least one of the factors is a monomial. *Clarification 2:* Refer to Properties of Operations, Equality and Inequality (Appendix D).
MA.8.AR.1.3:	Rewrite the sum of two algebraic expressions having a common monomial factor as a common factor multiplied by the sum of two algebraic expressions.
MA.8.DP.2.3:	Solve real-world problems involving probabilities related to single or repeated experiments, including making predictions based on theoretical probability. **Clarifications:** *Clarification 1:* Instruction includes making connections to proportional relationships and representing probability as a fraction, percentage or decimal. *Clarification 2:* Experiments to be repeated are limited to tossing a fair coin, rolling a fair die, picking a card randomly from a deck with replacement, picking marbles randomly from a bag with replacement and spinning a fair spinner. *Clarification 3:* Repetition of experiments is limited to two times except for tossing a coin.
MA.8.NSO.1.1:	Extend previous understanding of rational numbers to define irrational numbers within the real number system. Locate an approximate value of a numerical expression involving irrational numbers on a number line. **Clarifications:** *Clarification 1:* Instruction includes the use of number line and rational number approximations, and recognizing pi (π) as an irrational number. *Clarification 2:* Within this benchmark, the expectation is to approximate numerical expressions involving one arithmetic operation and estimating square roots or pi (π).
MA.8.NSO.1.2:	Plot, order and compare rational and irrational numbers, represented in various forms. **Clarifications:** *Clarification 1:* Within this benchmark, it is not the expectation to work with the number e. *Clarification 2:* Within this benchmark, the expectation is to plot, order and compare square roots and cube roots. *Clarification 3:* Within this benchmark, the expectation is to use symbols (<, > or =).
MA.8.NSO.1.7:	Solve multi-step mathematical and real-world problems involving the order of operations with rational numbers including exponents and radicals. **Clarifications:** *Clarification 1:* Multi-step expressions are limited to 6 or fewer steps. *Clarification 2:* Within this benchmark, the expectation is to simplify radicals by factoring square roots of perfect squares up to 225 and cube roots of perfect cubes from -125 to 125.
	Identify and interpret parts of an equation or expression that represent a quantity in terms of a mathematical or real-world context, including viewing one or more of its parts as a single entity.

MA.912.AR.1.1:	**Clarifications:** *Clarification 1:* Parts of an expression include factors, terms, constants, coefficients and variables. *Clarification 2:* Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.1.2:	Rearrange equations or formulas to isolate a quantity of interest. **Clarifications:** *Clarification 1*: Instruction includes using formulas for temperature, perimeter, area and volume; using equations for linear (standard, slope-intercept and point-slope forms) and quadratic (standard, factored and vertex forms) functions. *Clarification 2*: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.1.3:	Add, subtract and multiply polynomial expressions with rational number coefficients. **Clarifications:** *Clarification 1: I*nstruction includes an understanding that when any of these operations are performed with polynomials the result is also a polynomial. *Clarification 2:* Within the Algebra 1 course, polynomial expressions are limited to 3 or fewer terms.
MA.912.AR.1.4:	Divide a polynomial expression by a monomial expression with rational number coefficients. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, polynomial expressions are limited to 3 or fewer terms.
MA.912.AR.1.5:	Divide polynomial expressions using long division, synthetic division or algebraic manipulation.
MA.912.AR.1.7:	Rewrite a polynomial expression as a product of polynomials over the real number system. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, polynomial expressions are limited to 4 or fewer terms with integer coefficients.
MA.912.AR.1.9:	Apply previous understanding of rational number operations to add, subtract, multiply and divide rational algebraic expressions. **Clarifications:** *Clarification 1*: Instruction includes the connection to fractions and common denominators.
MA.912.AR.2.1:	Given a real-world context, write and solve one-variable multi-step linear equations.
MA.912.AR.2.2:	Write a linear two-variable equation to represent the relationship between two quantities from a graph, a written description or a table of values within a mathematical or real-world context. **Clarifications:** *Clarification 1:* Instruction includes the use of standard form, slope-intercept form and point-slope form, and the conversion between these forms.
MA.912.AR.2.3:	Write a linear two-variable equation for a line that is parallel or perpendicular to a given line and goes through a given point. **Clarifications:** *Clarification 1:* Instruction focuses on recognizing that perpendicular lines have slopes that when multiplied result in -1 and that parallel lines have slopes that are the same. *Clarification 2:* Instruction includes representing a line with a pair of points on the coordinate plane or with an equation. *Clarification 3:* Problems include cases where one variable has a coefficient of zero.
MA.912.AR.2.4:	Given a table, equation or written description of a linear function, graph that function, and determine and interpret its key features. **Clarifications:** *Clarification 1*: Key features are limited to domain, range, intercepts and rate of change. *Clarification 2*: Instruction includes the use of standard form, slope-intercept form and point-slope form. *Clarification 3*: Instruction includes cases where one variable has a coefficient of zero. *Clarification 4*: Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation. *Clarification 5*: Within the Algebra 1 course, notations for domain and range are limited to inequality and set-builder notations.
MA.912.AR.2.5:	Solve and graph mathematical and real-world problems that are modeled with linear functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain, range, intercepts and rate of change. *Clarification 2*: Instruction includes the use of standard form, slope-intercept form and point-slope form. *Clarification 3*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation. *Clarification 4*: Within the Algebra 1 course, notations for domain, range and constraints are limited to inequality and set-builder. *Clarification 5*: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.2.6:	Given a mathematical or real-world context, write and solve one-variable linear inequalities, including compound inequalities. Represent solutions algebraically or graphically.
MA.912.AR.2.7:	Write two-variable linear inequalities to represent relationships between quantities from a graph or a written description within a mathematical or real-world context. **Clarifications:** *Clarification 1:* Instruction includes the use of standard form, slope-intercept form and point-slope form and any inequality symbol can be represented. *Clarification 2:* Instruction includes cases where one variable has a coefficient of zero.
	Given a mathematical or real-world context, graph the solution set to a two-variable linear inequality.

MA.912.AR.2.8:	**Clarifications:** *Clarification 1:* Instruction includes the use of standard form, slope-intercept form and point-slope form and any inequality symbol can be represented. *Clarification 2:* Instruction includes cases where one variable has a coefficient of zero.
MA.912.AR.3.1:	Given a mathematical or real-world context, write and solve one-variable quadratic equations over the real number system. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, instruction includes the concept of non-real answers, without determining non-real solutions. *Clarification 2:* Within this benchmark, the expectation is to solve by factoring techniques, taking square roots, the quadratic formula and completing the square.
MA.912.AR.3.2:	Given a mathematical or real-world context, write and solve one-variable quadratic equations over the real and complex number systems. **Clarifications:** *Clarification 1*: Within this benchmark, the expectation is to solve by factoring techniques, taking square roots, the quadratic formula and completing the square.
MA.912.AR.3.5:	Given the x-intercepts and another point on the graph of a quadratic function, write the equation for the function.
MA.912.AR.3.6:	Given an expression or equation representing a quadratic function, determine the vertex and zeros and interpret them in terms of a real-world context.
MA.912.AR.3.7:	Given a table, equation or written description of a quadratic function, graph that function, and determine and interpret its key features. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior; vertex; and symmetry. *Clarification 2*: Instruction includes the use of standard form, factored form and vertex form, and sketching a graph using the zeros and vertex. *Clarification 3*: Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation. *Clarification 4*: Within the Algebra 1 course, notations for domain and range are limited to inequality and set-builder.
MA.912.AR.3.8:	Solve and graph mathematical and real-world problems that are modeled with quadratic functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior; vertex; and symmetry. *Clarification 2*: Instruction includes the use of standard form, factored form and vertex form. *Clarification 3*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation. *Clarification 4*: Within the Algebra 1 course, notations for domain, range and constraints are limited to inequality and set-builder.
MA.912.AR.3.9:	Given a mathematical or real-world context, write two-variable quadratic inequalities to represent relationships between quantities from a graph or a written description. **Clarifications:** *Clarification 1:* Instruction includes the use of standard form, factored form and vertex form where any inequality symbol can be represented.
MA.912.AR.3.10:	Given a mathematical or real-world context, graph the solution set to a two-variable quadratic inequality. **Clarifications:** *Clarification 1*: Instruction includes the use of standard form, factored form and vertex form where any inequality symbol can be represented.
MA.912.AR.4.1:	Given a mathematical or real-world context, write and solve one-variable absolute value equations.
MA.912.AR.4.2:	Given a mathematical or real-world context, write and solve one-variable absolute value inequalities. Represent solutions algebraically or graphically.
MA.912.AR.4.3:	Given a table, equation or written description of an absolute value function, graph that function and determine its key features. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; vertex; end behavior and symmetry. *Clarification 2*: Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation. *Clarification 3*: Within the Algebra 1 course, notations for domain and range are limited to inequality and set-builder.
MA.912.AR.4.4:	Solve and graph mathematical and real-world problems that are modeled with absolute value functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; vertex; end behavior and symmetry. *Clarification 2*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation.
MA.912.AR.5.1:	Solve one-variable exponential equations using the properties of exponents.
MA.912.AR.5.3:	Given a mathematical or real-world context, classify an exponential function as representing growth or decay. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, exponential functions are limited to the forms $f(x) = ab^x$, where *b* is a whole number greater than 1 or a unit fraction, or $f(x) = a(1 \pm r)^x$, where $0 < r < 1$.
	Write an exponential function to represent a relationship between two quantities from a graph, a written description or a table of values within a mathematical or real-world context. **Clarifications:**

MA.912.AR.5.4:	*Clarification 1:* Within the Algebra 1 course, exponential functions are limited to the forms $f(x) = ab^x$, where *b* is a whole number greater than 1 or a unit fraction, or $f(x) = a(1 \pm r)^x$, where $0 < r < 1$. *Clarification 2:* Within the Algebra 1 course, tables are limited to having successive nonnegative integer inputs so that the function may be determined by finding ratios between successive outputs.
MA.912.AR.5.6:	Given a table, equation or written description of an exponential function, graph that function and determine its key features. **Clarifications:** *Clarification 1:* Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; constant percent rate of change; end behavior and asymptotes. *Clarification 2:* Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation. *Clarification 3:* Within the Algebra 1 course, notations for domain and range are limited to inequality and set-builder. *Clarification 4:* Within the Algebra 1 course, exponential functions are limited to the forms $f(x) = ab^x$, where *b* is a whole number greater than 1 or a unit fraction or $f(x) = a(1 \pm r)^x$, where $0 < r < 1$.
MA.912.AR.5.8:	Given a table, equation or written description of a logarithmic function, graph that function and determine its key features. **Clarifications:** *Clarification 1:* Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior; and asymptotes. *Clarification 2:* Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation.
MA.912.AR.6.1:	Given a mathematical or real-world context, when suitable factorization is possible, solve one-variable polynomial equations of degree 3 or higher over the real and complex number systems.
MA.912.AR.6.5:	Sketch a rough graph of a polynomial function of degree 3 or higher using zeros, multiplicity and knowledge of end behavior.
MA.912.AR.7.1:	Solve one-variable radical equations. Interpret solutions as viable in terms of context and identify any extraneous solutions.
MA.912.AR.7.2:	Given a table, equation or written description of a square root or cube root function, graph that function and determine its key features. **Clarifications:** *Clarification 1:* Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior; and relative maximums and minimums. *Clarification 2:* Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation.
MA.912.AR.8.1:	Write and solve one-variable rational equations. Interpret solutions as viable in terms of the context and identify any extraneous solutions. **Clarifications:** *Clarification 1*: Within the Algebra 2 course, numerators and denominators are limited to linear and quadratic expressions.
MA.912.AR.8.2:	Given a table, equation or written description of a rational function, graph that function and determine its key features. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior; and asymptotes. *Clarification 2*: Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation. *Clarification 3*: Within the Algebra 2 course, numerators and denominators are limited to linear and quadratic expressions.
MA.912.AR.9.1:	Given a mathematical or real-world context, write and solve a system of two-variable linear equations algebraically or graphically. **Clarifications:** *Clarification 1*: Within this benchmark, the expectation is to solve systems using elimination, substitution and graphing. *Clarification 2*: Within the Algebra 1 course, the system is limited to two equations.
MA.912.AR.9.4:	Graph the solution set of a system of two-variable linear inequalities. **Clarifications:** *Clarification 1:* Instruction includes cases where one variable has a coefficient of zero. *Clarification 2:* Within the Algebra 1 course, the system is limited to two inequalities.
MA.912.AR.9.6:	Given a real-world context, represent constraints as systems of linear equations or inequalities. Interpret solutions to problems as viable or non-viable options. **Clarifications:** *Clarification 1*: Instruction focuses on analyzing a given function that models a real-world situation and writing constraints that are represented as linear equations or linear inequalities.
MA.912.AR.9.10:	Solve and graph mathematical and real-world problems that are modeled with piecewise functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain, range, intercepts, asymptotes and end behavior. *Clarification 2*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation.
MA.912.AR.10.1:	Given a mathematical or real-world context, write and solve problems involving arithmetic sequences.
MA.912.AR.10.2:	Given a mathematical or real-world context, write and solve problems involving geometric sequences.
MA.912.DP.1.1:	Given a set of data, select an appropriate method to represent the data, depending on whether it is numerical or categorical data and on whether it is univariate or bivariate. **Clarifications:** *Clarification 1:* Instruction includes discussions regarding the strengths and weaknesses of each data display. *Clarification 2:* Numerical univariate includes histograms, stem-and-leaf plots, box plots and line plots; numerical bivariate includes scatter

	plots and line graphs; categorical univariate includes bar charts, circle graphs, line plots, frequency tables and relative frequency tables; and categorical bivariate includes segmented bar charts, joint frequency tables and joint relative frequency tables. *Clarification 3:* Instruction includes the use of appropriate units and labels and, where appropriate, using technology to create data displays.
MA.912.DP.1.2:	Interpret data distributions represented in various ways. State whether the data is numerical or categorical, whether it is univariate or bivariate and interpret the different components and quantities in the display. **Clarifications:** *Clarification 1*: Within the Probability and Statistics course, instruction includes the use of spreadsheets and technology.
MA.912.DP.1.3:	Explain the difference between correlation and causation in the contexts of both numerical and categorical data.
MA.912.DP.1.4:	Estimate a population total, mean or percentage using data from a sample survey; develop a margin of error through the use of simulation. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, the margin of error will be given.
MA.912.DP.2.1:	For two or more sets of numerical univariate data, calculate and compare the appropriate measures of center and measures of variability, accounting for possible effects of outliers. Interpret any notable features of the shape of the data distribution. **Clarifications:** *Clarification 1*: The measure of center is limited to mean and median. The measure of variation is limited to range, interquartile range, and standard deviation. *Clarification 2*: Shape features include symmetry or skewness and clustering. *Clarification 3*: Within the Probability and Statistics course, instruction includes the use of spreadsheets and technology.
MA.912.DP.2.4:	Fit a linear function to bivariate numerical data that suggests a linear association and interpret the slope and y-intercept of the model. Use the model to solve real-world problems in terms of the context of the data. **Clarifications:** *Clarification 1*: Instruction includes fitting a linear function both informally and formally with the use of technology. *Clarification 2*: Problems include making a prediction or extrapolation, inside and outside the range of the data, based on the equation of the line of fit.
MA.912.DP.2.5:	Given a scatter plot that represents bivariate numerical data, assess the fit of a given linear function by plotting and analyzing residuals. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, instruction includes determining the number of positive and negative residuals; the largest and smallest residuals; and the connection between outliers in the data set and the corresponding residuals.
MA.912.DP.2.6:	Given a scatter plot with a line of fit and residuals, determine the strength and direction of the correlation. Interpret strength and direction within a real-world context. **Clarifications:** *Clarification 1*: Instruction focuses on determining the direction by analyzing the slope and informally determining the strength by analyzing the residuals.
MA.912.DP.3.1:	Construct a two-way frequency table summarizing bivariate categorical data. Interpret joint and marginal frequencies and determine possible associations in terms of a real-world context.
MA.912.DP.3.2:	Given marginal and conditional relative frequencies, construct a two-way relative frequency table summarizing categorical bivariate data. **Clarifications:** *Clarification 1:* Construction includes cases where not all frequencies are given but enough are provided to be able to construct a two-way relative frequency table. *Clarification 2:* Instruction includes the use of a tree diagram when calculating relative frequencies to construct tables.
MA.912.DP.3.3:	Given a two-way relative frequency table or segmented bar graph summarizing categorical bivariate data, interpret joint, marginal and conditional relative frequencies in terms of a real-world context. **Clarifications:** *Clarification 1:* Instruction includes problems involving false positive and false negatives.
MA.912.F.1.1:	Given an equation or graph that defines a function, determine the function type. Given an input-output table, determine a function type that could represent it. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, functions represented as tables are limited to linear, quadratic and exponential. *Clarification 2:* Within the Algebra 1 course, functions represented as equations or graphs are limited to vertical or horizontal translations or reflections over the x-axis of the following parent functions: $f(x)=x$, $f(x)=x^2$, $f(x)=x^3$, $f(x)=\sqrt{x}$, $f(x)=\sqrt[3]{x}$, $f(x)=\lvert x \rvert$, $f(x)=2^x$ and $f(x)=\left(\frac{1}{2}\right)^x$.
MA.912.F.1.2:	Given a function represented in function notation, evaluate the function for an input in its domain. For a real-world context, interpret the output. **Clarifications:** *Clarification 1*: Problems include simple functions in two-variables, such as f(x,y)=3x-2y. *Clarification 2*: Within the Algebra 1 course, functions are limited to one-variable such as f(x)=3x.
MA.912.F.1.3:	Calculate and interpret the average rate of change of a real-world situation represented graphically, algebraically or in a table over a specified interval. **Clarifications:** *Clarification 1*: Instruction includes making the connection to determining the slope of a particular line segment.
MA.912.F.1.5:	Compare key features of linear functions each represented algebraically, graphically, in tables or written descriptions. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; slope and end behavior.

MA.912.F.1.6:	Compare key features of linear and nonlinear functions each represented algebraically, graphically, in tables or written descriptions. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior and asymptotes. *Clarification 2*: Within the Algebra 1 course, functions other than linear, quadratic or exponential must be represented graphically. *Clarification 3*: Within the Algebra 1 course, instruction includes verifying that a quantity increasing exponentially eventually exceeds a quantity increasing linearly or quadratically.
MA.912.F.1.8:	Determine whether a linear, quadratic or exponential function best models a given real-world situation. **Clarifications:** *Clarification 1*: Instruction includes recognizing that linear functions model situations in which a quantity changes by a constant amount per unit interval; that quadratic functions model situations in which a quantity increases to a maximum, then begins to decrease or a quantity decreases to a minimum, then begins to increase; and that exponential functions model situations in which a quantity grows or decays by a constant percent per unit interval. *Clarification 2*: Within this benchmark, the expectation is to identify the type of function from a written description or table.
MA.912.F.2.1:	Identify the effect on the graph or table of a given function after replacing $f(x)$ by $f(x)+k$,$kf(x)$, $f(kx)$ and $f(x+k)$ for specific values of k. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, functions are limited to linear, quadratic and absolute value. *Clarification 2*: Instruction focuses on including positive and negative values for k.
MA.912.F.2.3:	Given the graph or table of f(x) and the graph or table of f(x)+k,kf(x), f(kx) and f(x+k), state the type of transformation and find the value of the real number k. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, functions are limited to linear, quadratic and absolute value.
MA.912.F.3.1:	Given a mathematical or real-world context, combine two functions, limited to linear and quadratic, using arithmetic operations. When appropriate, include domain restrictions for the new function. **Clarifications:** *Clarification 1*: Instruction includes representing domain restrictions with inequality notation, interval notation or set-builder notation. *Clarification 2*: Within the Algebra 1 Honors course, notations for domain and range are limited to inequality and set-builder.
MA.912.F.3.6:	Determine whether an inverse function exists by analyzing tables, graphs and equations.
MA.912.FL.1.1:	Extend previous knowledge of operations of fractions, percentages and decimals to solve real-world problems involving money and business. **Clarifications:** *Clarification 1*: Problems include discounts, markups, simple interest, tax, tips, fees, percent increase, percent decrease and percent error.
MA.912.FL.1.2:	Extend previous knowledge of ratios and proportional relationships to solve real-world problems involving money and business.
MA.912.FL.1.3:	Solve real-world problems involving weighted averages using spreadsheets and other technology.
MA.912.FL.3.2:	Solve real-world problems involving simple, compound and continuously compounded interest. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, interest is limited to simple and compound.
MA.912.FL.3.4:	Explain the relationship between simple interest and linear growth. Explain the relationship between compound interest and exponential growth and the relationship between continuously compounded interest and exponential growth. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, exponential growth is limited to compound interest.
MA.912.GR.1.1:	Prove relationships and theorems about lines and angles. Solve mathematical and real-world problems involving postulates, relationships and theorems of lines and angles. **Clarifications:** *Clarification 1*: Postulates, relationships and theorems include vertical angles are congruent; when a transversal crosses parallel lines, the consecutive angles are supplementary and alternate (interior and exterior) angles and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints. *Clarification 2*: Instruction includes constructing two-column proofs, pictorial proofs, paragraph and narrative proofs, flow chart proofs or informal proofs. *Clarification 3*: Instruction focuses on helping a student choose a method they can use reliably.
MA.912.GR.1.2:	Prove triangle congruence or similarity using Side-Side-Side, Side-Angle-Side, Angle-Side-Angle, Angle-Angle-Side, Angle-Angle and Hypotenuse-Leg. **Clarifications:** *Clarification 1*: Instruction includes constructing two-column proofs, pictorial proofs, paragraph and narrative proofs, flow chart proofs or informal proofs. *Clarification 2*: Instruction focuses on helping a student choose a method they can use reliably.
MA.912.GR.1.3:	Prove relationships and theorems about triangles. Solve mathematical and real-world problems involving postulates, relationships and theorems of triangles. **Clarifications:** *Clarification 1*: Postulates, relationships and theorems include measures of interior angles of a triangle sum to 180°; measures of a set of exterior angles of a triangle sum to 360°; triangle inequality theorem; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point. *Clarification 2*: Instruction includes constructing two-column proofs, pictorial proofs, paragraph and narrative proofs, flow chart proofs or informal proofs. *Clarification 3*: Instruction focuses on helping a student choose a method they can use reliably.

MA.912.GR.1.4:	Prove relationships and theorems about parallelograms. Solve mathematical and real-world problems involving postulates, relationships and theorems of parallelograms. **Clarifications:** *Clarification 1*: Postulates, relationships and theorems include opposite sides are congruent, consecutive angles are supplementary, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and rectangles are parallelograms with congruent diagonals. *Clarification 2*: Instruction includes constructing two-column proofs, pictorial proofs, paragraph and narrative proofs, flow chart proofs or informal proofs. *Clarification 3*: Instruction focuses on helping a student choose a method they can use reliably.
MA.912.GR.1.5:	Prove relationships and theorems about trapezoids. Solve mathematical and real-world problems involving postulates, relationships and theorems of trapezoids. **Clarifications:** *Clarification 1*: Postulates, relationships and theorems include the Trapezoid Midsegment Theorem and for isosceles trapezoids: base angles are congruent, opposite angles are supplementary and diagonals are congruent. *Clarification 2*: Instruction includes constructing two-column proofs, pictorial proofs, paragraph and narrative proofs, flow chart proofs or informal proofs. *Clarification 3*: Instruction focuses on helping a student choose a method they can use reliably.
MA.912.GR.1.6:	Solve mathematical and real-world problems involving congruence or similarity in two-dimensional figures. **Clarifications:** *Clarification 1:* Instruction includes demonstrating that two-dimensional figures are congruent or similar based on given information.
MA.912.GR.2.1:	Given a preimage and image, describe the transformation and represent the transformation algebraically using coordinates. **Clarifications:** *Clarification 1*: Instruction includes the connection of transformations to functions that take points in the plane as inputs and give other points in the plane as outputs. *Clarification 2*: Transformations include translations, dilations, rotations and reflections described using words or using coordinates. *Clarification 3*: Within the Geometry course, rotations are limited to 90°, 180° and 270° counterclockwise or clockwise about the center of rotation, and the centers of rotations and dilations are limited to the origin or a point on the figure.
MA.912.GR.2.2:	Identify transformations that do or do not preserve distance. **Clarifications:** *Clarification 1*: Transformations include translations, dilations, rotations and reflections described using words or using coordinates. *Clarification 2*: Instruction includes recognizing that these transformations preserve angle measure.
MA.912.GR.2.3:	Identify a sequence of transformations that will map a given figure onto itself or onto another congruent or similar figure. **Clarifications:** *Clarification 1*: Transformations include translations, dilations, rotations and reflections described using words or using coordinates. *Clarification 2*: Within the Geometry course, figures are limited to triangles and quadrilaterals and rotations are limited to 90°, 180° and 270° counterclockwise or clockwise about the center of rotation. *Clarification 3*: Instruction includes the understanding that when a figure is mapped onto itself using a reflection, it occurs over a line of symmetry.
MA.912.GR.2.5:	Given a geometric figure and a sequence of transformations, draw the transformed figure on a coordinate plane. **Clarifications:** *Clarification 1*: Transformations include translations, dilations, rotations and reflections described using words or using coordinates. *Clarification 2*: Instruction includes two or more transformations.
MA.912.GR.2.6:	Apply rigid transformations to map one figure onto another to justify that the two figures are congruent. **Clarifications:** *Clarification 1*: Instruction includes showing that the corresponding sides and the corresponding angles are congruent.
MA.912.GR.2.8:	Apply an appropriate transformation to map one figure onto another to justify that the two figures are similar. **Clarifications:** *Clarification 1*: Instruction includes showing that the corresponding sides are proportional, and the corresponding angles are congruent.
MA.912.GR.3.1:	Determine the weighted average of two or more points on a line. **Clarifications:** *Clarification 1*: Instruction includes using a number line and determining how changing the weights moves the weighted average of points on the number line.
MA.912.GR.3.2:	Given a mathematical context, use coordinate geometry to classify or justify definitions, properties and theorems involving circles, triangles or quadrilaterals. **Clarifications:** *Clarification 1*: Instruction includes using the distance or midpoint formulas and knowledge of slope to classify or justify definitions, properties and theorems.
MA.912.GR.3.3:	Use coordinate geometry to solve mathematical and real-world geometric problems involving lines, circles, triangles and quadrilaterals. **Clarifications:** *Clarification 1*: Problems involving lines include the coordinates of a point on a line segment including the midpoint. *Clarification 2*: Problems involving circles include determining points on a given circle and finding tangent lines. *Clarification 3*: Problems involving triangles include median and centroid.

	Clarification 4: Problems involving quadrilaterals include using parallel and perpendicular slope criteria.
MA.912.GR.3.4:	Use coordinate geometry to solve mathematical and real-world problems on the coordinate plane involving perimeter or area of polygons.
MA.912.GR.4.1:	Identify the shapes of two-dimensional cross-sections of three-dimensional figures. **Clarifications:** *Clarification 1*: Instruction includes the use of manipulatives and models to visualize cross-sections. *Clarification 2*: Instruction focuses on cross-sections of right cylinders, right prisms, right pyramids and right cones that are parallel or perpendicular to the base.
MA.912.GR.4.2:	Identify three-dimensional objects generated by rotations of two-dimensional figures. **Clarifications:** *Clarification 1*: The axis of rotation must be within the same plane but outside of the given two-dimensional figure.
MA.912.GR.4.3:	Extend previous understanding of scale drawings and scale factors to determine how dilations affect the area of two-dimensional figures and the surface area or volume of three-dimensional figures.
MA.912.GR.4.4:	Solve mathematical and real-world problems involving the area of two-dimensional figures. **Clarifications:** *Clarification 1*: Instruction includes concepts of population density based on area.
MA.912.GR.4.5:	Solve mathematical and real-world problems involving the volume of three-dimensional figures limited to cylinders, pyramids, prisms, cones and spheres. **Clarifications:** *Clarification 1:* Instruction includes concepts of density based on volume. *Clarification 2:* Instruction includes using Cavalieri's Principle to give informal arguments about the formulas for the volumes of right and non-right cylinders, pyramids, prisms and cones.
MA.912.GR.4.6:	Solve mathematical and real-world problems involving the surface area of three-dimensional figures limited to cylinders, pyramids, prisms, cones and spheres.
MA.912.GR.5.1:	Construct a copy of a segment or an angle. **Clarifications:** *Clarification 1*: Instruction includes using compass and straightedge, string, reflective devices, paper folding or dynamic geometric software.
MA.912.GR.5.2:	Construct the bisector of a segment or an angle, including the perpendicular bisector of a line segment. **Clarifications:** *Clarification 1*: Instruction includes using compass and straightedge, string, reflective devices, paper folding or dynamic geometric software.
MA.912.GR.5.3:	Construct the inscribed and circumscribed circles of a triangle. **Clarifications:** *Clarification 1*: Instruction includes using compass and straightedge, string, reflective devices, paper folding or dynamic geometric software.
MA.912.GR.5.4:	Construct a regular polygon inscribed in a circle. Regular polygons are limited to triangles, quadrilaterals and hexagons. **Clarifications:** *Clarification 1*: When given a circle, the center must be provided. *Clarification 2*: Instruction includes using compass and straightedge, string, reflective devices, paper folding or dynamic geometric software.
MA.912.GR.5.5:	Given a point outside a circle, construct a line tangent to the circle that passes through the given point. **Clarifications:** *Clarification 1*: When given a circle, the center must be provided. *Clarification 2*: Instruction includes using compass and straightedge, string, reflective devices, paper folding or dynamic geometric software.
MA.912.GR.6.1:	Solve mathematical and real-world problems involving the length of a secant, tangent, segment or chord in a given circle. **Clarifications:** *Clarification 1:* Problems include relationships between two chords; two secants; a secant and a tangent; and the length of the tangent from a point to a circle.
MA.912.GR.6.2:	Solve mathematical and real-world problems involving the measures of arcs and related angles. **Clarifications:** *Clarification 1*: Within the Geometry course, problems are limited to relationships between inscribed angles; central angles; and angles formed by the following intersections: a tangent and a secant through the center, two tangents, and a chord and its perpendicular bisector.
MA.912.GR.6.3:	Solve mathematical problems involving triangles and quadrilaterals inscribed in a circle. **Clarifications:** *Clarification 1*: Instruction includes cases in which a triangle inscribed in a circle has a side that is the diameter.
MA.912.GR.6.4:	Solve mathematical and real-world problems involving the arc length and area of a sector in a given circle. **Clarifications:** *Clarification 1*: Instruction focuses on the conceptual understanding that for a given angle measure the length of the intercepted arc is proportional to the radius, and for a given radius the length of the intercepted arc is proportional is the angle measure.
MA.912.GR.7.2:	Given a mathematical or real-world context, derive and create the equation of a circle using key features. **Clarifications:** *Clarification 1:* Instruction includes using the Pythagorean Theorem and completing the square. *Clarification 2:* Within the Geometry course, key features are limited to the radius, diameter and the center.
	Graph and solve mathematical and real-world problems that are modeled with an equation of a circle. Determine and interpret key features in terms of the context. **Clarifications:**

MA.912.GR.7.3:	*Clarification 1*: Key features are limited to domain, range, eccentricity, center and radius. *Clarification 2*: Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation. *Clarification 3*: Within the Geometry course, notations for domain and range are limited to inequality and set-builder.
MA.912.NSO.1.1:	Extend previous understanding of the Laws of Exponents to include rational exponents. Apply the Laws of Exponents to evaluate numerical expressions and generate equivalent numerical expressions involving rational exponents. **Clarifications:** *Clarification 1:* Instruction includes the use of technology when appropriate. *Clarification 2:* Refer to the K-12 Formulas (Appendix E) for the Laws of Exponents. *Clarification 3:* Instruction includes converting between expressions involving rational exponents and expressions involving radicals. *Clarification 4:*Within the Mathematics for Data and Financial Literacy course, it is not the expectation to generate equivalent numerical expressions.
MA.912.NSO.1.2:	Generate equivalent algebraic expressions using the properties of exponents.
MA.912.NSO.1.4:	Apply previous understanding of operations with rational numbers to add, subtract, multiply and divide numerical radicals. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, expressions are limited to a single arithmetic operation involving two square roots or two cube roots.
MA.912.NSO.1.6:	Given a numerical logarithmic expression, evaluate and generate equivalent numerical expressions using the properties of logarithms or exponents. **Clarifications:** *Clarification 1*: Within the Mathematics for Data and Financial Literacy Honors course, problem types focus on money and business.
MA.912.NSO.2.2:	Represent addition, subtraction, multiplication and conjugation of complex numbers geometrically on the complex plane.
MA.912.T.1.1:	Define trigonometric ratios for acute angles in right triangles. **Clarifications:** *Clarification 1*: Instruction includes using the Pythagorean Theorem and using similar triangles to demonstrate that trigonometric ratios stay the same for similar right triangles. *Clarification 2*: Within the Geometry course, instruction includes using the coordinate plane to make connections to the unit circle. *Clarification 3*: Within the Geometry course, trigonometric ratios are limited to sine, cosine and tangent.
MA.912.T.1.2:	Solve mathematical and real-world problems involving right triangles using trigonometric ratios and the Pythagorean Theorem. **Clarifications:** *Clarification 1*: Instruction includes procedural fluency with the relationships of side lengths in special right triangles having angle measures of 30°-60°-90° and 45°-45°-90°.
MA.K12.MTR.1.1:	Mathematicians who participate in effortful learning both individually and with others: • Analyze the problem in a way that makes sense given the task. • Ask questions that will help with solving the task. • Build perseverance by modifying methods as needed while solving a challenging task. • Stay engaged and maintain a positive mindset when working to solve tasks. • Help and support each other when attempting a new method or approach. **Clarifications:** Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: • Build understanding through modeling and using manipulatives. • Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. • Progress from modeling problems with objects and drawings to using algorithms and equations. • Express connections between concepts and representations. • Choose a representation based on the given context or purpose. **Clarifications:** Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations. **Clarifications:** Teachers who encourage students to complete tasks with mathematical fluency:

	• Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. • Offer multiple opportunities for students to practice efficient and generalizable methods. • Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: • Communicate mathematical ideas, vocabulary and methods effectively. • Analyze the mathematical thinking of others. • Compare the efficiency of a method to those expressed by others. • Recognize errors and suggest how to correctly solve the task. • Justify results by explaining methods and processes. • Construct possible arguments based on evidence. **Clarifications:** Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. **Clarifications:** Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. **Clarifications:** Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems. • Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. **Clarifications:** Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. **Clarifications:** K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.

	6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. **Clarifications:** See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. **Clarifications:** Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like “Why is the girl smiling?” or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. **Clarifications:** In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: “I think _______ because ______.” The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. **Clarifications:** Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. **Clarifications:** In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

General Course Information and Notes

VERSION DESCRIPTION

This course supports students who need additional instruction in foundational mathematics skills as it relates to core instruction. Instruction will use explicit, systematic, and sequential approaches to mathematics instruction addressing all strands including number sense & operations, algebraic reasoning, functions, geometric reasoning and data analysis & probability. Teachers will use the listed benchmarks that correspond to each students’ needs.

Effective instruction matches instruction to the need of the students in the group and provides multiple opportunities to practice the skill and receive feedback. The additional time allotted for this course is in addition to core instruction. The intervention includes materials and strategies designed to supplement core instruction.

GENERAL NOTES

Florida’s Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards
This course includes Florida’s B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL’s need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Number: 1200400

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Remedial >

Abbreviated Title: FDN SKILLS MATH 9-12

Course Length: Multiple (M) - Course length can vary

Course Attributes:

- Class Size Core Required

Course Type: Elective Course

Course Level: 1

Course Status: State Board Approved

Educator Certifications

Mathematics (Grades 6-12)
Middle Grades Mathematics (Middle Grades 5-9)

Mathematics for College Readiness (#1200700) 2015 - 2022

(current)

Course Standards

<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td>MAFS.7.EE.2.4:</td><td>Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.
a. Solve word problems leading to equations of the form px + q = r and p(x + q) = r, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?
b. Solve word problems leading to inequalities of the form px + q > r or px + q < r, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. For example: As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions.

Clarifications:
Fluency Expectations or Examples of Culminating Standards

In solving word problems leading to one-variable equations of the form px + q = r and p(x + q) = r, students solve the equations fluently. This will require fluency with rational number arithmetic (7.NS.1.1–1.3), as well as fluency to some extent with applying properties operations to rewrite linear expressions with rational coefficients (7.EE.1.1).

Examples of Opportunities for In-Depth Focus

Work toward meeting this standard builds on the work that led to meeting 6.EE.2.7 and prepares students for the work that will lead to meeting 8.EE.3.7.</td></tr>
<tr><td>MAFS.7.NS.1.1:</td><td>Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.
a. Describe situations in which opposite quantities combine to make 0. For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.
b. Understand p + q as the number located a distance |q| from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.
c. Understand subtraction of rational numbers as adding the additive inverse, p – q = p + (–q). Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.
d. Apply properties of operations as strategies to add and subtract rational numbers.

Clarifications:
Fluency Expectations or Examples of Culminating Standards

Adding, subtracting, multiplying, and dividing rational numbers is the culmination of numerical work with the four basic operations. The number system will continue to develop in grade 8, expanding to become the real numbers by the introduction of irrational numbers, and will develop further in high school, expanding to become the complex numbers with the introduction of imaginary numbers. Because there are no specific standards for rational number arithmetic in later grades and because so much other work in grade 7 depends on rational number arithmetic, fluency with rational number arithmetic should be the goal in grade 7.</td></tr>
<tr><td>MAFS.7.NS.1.2:</td><td>Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.
a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (–1)(–1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.
b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then –(p/q) = (–p)/q = p/(–q). Interpret quotients of rational numbers by describing real-world contexts.
c. Apply properties of operations as strategies to multiply and divide rational numbers.
d. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.

Clarifications:
Fluency Expectations or Examples of Culminating Standards

Adding, subtracting, multiplying, and dividing rational numbers is the culmination of numerical work with the four basic operations. The number system will continue to develop in grade 8, expanding to become the real numbers by the introduction of irrational numbers, and will develop further in high school, expanding to become the complex numbers with the introduction of imaginary numbers. Because there are no specific standards for rational number arithmetic in later grades and because so much other work in grade 7 depends on rational number arithmetic, fluency with rational number arithmetic should be the goal in grade 7.</td></tr>
</table>

MAFS.8.EE.1.1:	Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example, $3^2 \times$ □ = □ $=1/3^3=1/27$.*
MAFS.8.EE.1.4:	Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.
MAFS.8.EE.2.5:	Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. *For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.* **Clarifications:** **Examples of Opportunities for In-Depth Focus** When students work toward meeting this standard, they build on grades 6–7 work with proportions and position themselves for grade 8 work with functions and the equation of a line.
MAFS.8.F.2.4:	Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.
MAFS.8.NS.1.1:	Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.
MAFS.8.NS.1.2:	Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2). *For example, by truncating the decimal expansion of $\sqrt{2}$, show that $\sqrt{2}$ is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.*
MAFS.912.A-APR.1.1:	Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. **Clarifications:** **Algebra 1 - Fluency Recommendations** Fluency in adding, subtracting, and multiplying polynomials supports students throughout their work in algebra, as well as in their symbolic work with functions. Manipulation can be more mindful when it is fluent.
MAFS.912.A-APR.2.3:	Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.
MAFS.912.A-APR.3.4:	Prove polynomial identities and use them to describe numerical relationships. For example, the polynomial identity $(x^2 + y^2)^2 = (x^2 - y^2)^2 + (2xy)^2$ can be used to generate Pythagorean triples.
MAFS.912.A-APR.4.6:	Rewrite simple rational expressions in different forms; write a(x)/b(x) in the form q(x) + r(x)/b(x), where a(x), b(x), q(x), and r(x) are polynomials with the degree of r(x) less than the degree of b(x), using inspection, long division, or, for the more complicated examples, a computer algebra system.
MAFS.912.A-APR.4.7:	Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.
MAFS.912.A-CED.1.1:	Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational, absolute, and exponential functions. ★
MAFS.912.A-CED.1.2:	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. ★
MAFS.912.A-CED.1.3:	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.* ★
MAFS.912.A-CED.1.4:	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law V = IR to highlight resistance R.* ★
MAFS.912.A-REI.1.1:	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
MAFS.912.A-REI.1.2:	Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.
MAFS.912.A-REI.2.3:	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
MAFS.912.A-REI.2.4:	Solve quadratic equations in one variable. a. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form. b. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.
MAFS.912.A-REI.3.5:	Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.
MAFS.912.A-REI.3.6:	Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
MAFS.912.A-REI.4.10:	Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).
MAFS.912.A-REI.4.11:	Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. ★
MAFS.912.A-SSE.1.1:	Interpret expressions that represent a quantity in terms of its context. ★ a. Interpret parts of an expression, such as terms, factors, and coefficients. b. Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret □ as the product of P and a factor not depending on P.*

MAFS.912.A-SSE.1.2:	Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.*
MAFS.912.A-SSE.2.3:	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.★ a. Factor a quadratic expression to reveal the zeros of the function it defines. b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. c. Use the properties of exponents to transform expressions for exponential functions. *For example the expression 1.15^t can be rewritten as $(1.15^{1/12})^{12t} \approx 1.012^{12t}$ to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.*
MAFS.912.F-BF.1.1:	Write a function that describes a relationship between two quantities. ★ a. Determine an explicit expression, a recursive process, or steps for calculation from a context. b. Combine standard function types using arithmetic operations. *For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.* c. Compose functions. *For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time.*
MAFS.912.F-BF.2.3:	Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. *Include recognizing even and odd functions from their graphs and algebraic expressions for them.*
MAFS.912.F-IF.1.1:	Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input x. The graph of f is the graph of the equation y = f(x).
MAFS.912.F-IF.2.4:	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.* ★
MAFS.912.F-IF.2.5:	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble engines in a factory, then the positive integers would be an appropriate domain for the function.* ★
MAFS.912.F-IF.2.6:	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. ★
MAFS.912.F-IF.3.7:	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. ★ a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift.
MAFS.912.F-IF.3.8:	Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. b. Use the properties of exponents to interpret expressions for exponential functions. *For example, identify percent rate of change in functions such as $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)^{12t}$, $y = (1.2)^{t/10}$, and classify them as representing exponential growth or decay.*
MAFS.912.G-GPE.2.5:	Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point). **Clarifications:** **Geometry - Fluency Recommendations** Fluency with the use of coordinates to establish geometric results, calculate length and angle, and use geometric representations as a modeling tool are some of the most valuable tools in mathematics and related fields.
MAFS.912.G-GPE.2.6:	Find the point on a directed line segment between two given points that partitions the segment in a given ratio.
MAFS.912.G-GPE.2.7:	Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula. ★ **Clarifications:** **Geometry - Fluency Recommendations** Fluency with the use of coordinates to establish geometric results, calculate length and angle, and use geometric representations as a modeling tool are some of the most valuable tools in mathematics and related fields.
MAFS.912.N-Q.1.1:	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★
MAFS.912.N-Q.1.2:	Define appropriate quantities for the purpose of descriptive modeling. ★ **Clarifications:** **Algebra 1 Content Notes:** Working with quantities and the relationships between them provides grounding for work with expressions, equations, and functions.
MAFS.912.N-Q.1.3:	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★
MAFS.912.N-RN.1.1:	Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. *For example, we define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5^{(1/3)3}$ to hold, so $(5^{1/3})^3$ must equal 5.*

MAFS.912.N-RN.1.2:	Rewrite expressions involving radicals and rational exponents using the properties of exponents.
MAFS.912.N-RN.2.3:	Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.
MAFS.912.S-ID.2.5:	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. ★
MAFS.912.S-ID.2.6:	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. ★ a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. *Use given functions or choose a function suggested by the context. Emphasize linear, and exponential models.* b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association. **Clarifications:** Students take a more sophisticated look at using a linear function to model the relationship between two numerical variables. In addition to fitting a line to data, students assess how well the model fits by analyzing residuals.
MAFS.912.S-ID.3.7:	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. ★
MAFS.K12.MP.1.1:	**Make sense of problems and persevere in solving them.** Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
MAFS.K12.MP.2.1:	**Reason abstractly and quantitatively**. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
MAFS.K12.MP.3.1:	**Construct viable arguments and critique the reasoning of others.** Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
MAFS.K12.MP.4.1:	**Model with mathematics.** Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
MAFS.K12.MP.5.1:	**Use appropriate tools strategically.** Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
MAFS.K12.MP.6.1:	**Attend to precision.** Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and

	efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
MAFS.K12.MP.7.1:	**Look for and make use of structure.** Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
MAFS.K12.MP.8.1:	**Look for and express regularity in repeated reasoning.** Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

VERSION DESCRIPTION

This course is targeted for students who are not yet "college ready" in mathematics or simply need some additional instruction in content to prepare them for success in college level mathematics. This course incorporates the Florida Standards for Mathematical Practices as well as the following Florida Standards for Mathematical Content: Expressions and Equations, The Number System, Functions, Algebra, Geometry, Number and Quantity, Statistics and Probability, and the Florida Standards for High School Modeling. The standards align with the Mathematics Postsecondary Readiness Competencies deemed necessary for entry-level college courses.

English Language Development (ELD) Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English Language Learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximize an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please clock on the following link: {{AzureStorageLink}}/uploads/docs/standards/eld/ma.pdf.

For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

Additional Instructional Resources:

A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGI/cms/review.html?Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

Course Number: 1200700

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Algebra >

Abbreviated Title: MATH COLL READINESS

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- Class Size Core Required

Course Type: Core Academic Course

Course Level: 2

Course Status: Course Approved

Grade Level(s): 9,10,11,12,30,31

Graduation Requirement: Mathematics

Educator Certifications

Course Standards

Name	Description
MA.912.AR.1.2:	Rearrange equations or formulas to isolate a quantity of interest. **Clarifications:** *Clarification 1*: Instruction includes using formulas for temperature, perimeter, area and volume; using equations for linear (standard, slope-intercept and point-slope forms) and quadratic (standard, factored and vertex forms) functions. *Clarification 2*: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.1.3:	Add, subtract and multiply polynomial expressions with rational number coefficients. **Clarifications:** *Clarification 1: I*nstruction includes an understanding that when any of these operations are performed with polynomials the result is also a polynomial. *Clarification 2:* Within the Algebra 1 course, polynomial expressions are limited to 3 or fewer terms.
MA.912.AR.1.5:	Divide polynomial expressions using long division, synthetic division or algebraic manipulation.
MA.912.AR.1.9:	Apply previous understanding of rational number operations to add, subtract, multiply and divide rational algebraic expressions. **Clarifications:** *Clarification 1*: Instruction includes the connection to fractions and common denominators.
MA.912.AR.2.4:	Given a table, equation or written description of a linear function, graph that function, and determine and interpret its key features. **Clarifications:** *Clarification 1*: Key features are limited to domain, range, intercepts and rate of change. *Clarification 2*: Instruction includes the use of standard form, slope-intercept form and point-slope form. *Clarification 3*: Instruction includes cases where one variable has a coefficient of zero. *Clarification 4*: Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation. *Clarification 5*: Within the Algebra 1 course, notations for domain and range are limited to inequality and set-builder notations.
MA.912.AR.2.5:	Solve and graph mathematical and real-world problems that are modeled with linear functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain, range, intercepts and rate of change. *Clarification 2*: Instruction includes the use of standard form, slope-intercept form and point-slope form. *Clarification 3*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation. *Clarification 4*: Within the Algebra 1 course, notations for domain, range and constraints are limited to inequality and set-builder. *Clarification 5*: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.3.7:	Given a table, equation or written description of a quadratic function, graph that function, and determine and interpret its key features. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior; vertex; and symmetry. *Clarification 2*: Instruction includes the use of standard form, factored form and vertex form, and sketching a graph using the zeros and vertex. *Clarification 3*: Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation. *Clarification 4*: Within the Algebra 1 course, notations for domain and range are limited to inequality and set-builder.
MA.912.AR.3.8:	Solve and graph mathematical and real-world problems that are modeled with quadratic functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior; vertex; and symmetry. *Clarification 2*: Instruction includes the use of standard form, factored form and vertex form. *Clarification 3*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation. *Clarification 4*: Within the Algebra 1 course, notations for domain, range and constraints are limited to inequality and set-builder.
MA.912.AR.4.2:	Given a mathematical or real-world context, write and solve one-variable absolute value inequalities. Represent solutions algebraically or graphically.
	Solve and graph mathematical and real-world problems that are modeled with absolute value functions. Interpret key features and determine constraints in terms of the context.

MA.912.AR.4.4:	**Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; vertex; end behavior and symmetry. *Clarification 2*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation.
MA.912.AR.5.2:	Solve one-variable equations involving logarithms or exponential expressions. Interpret solutions as viable in terms of the context and identify any extraneous solutions.
MA.912.AR.5.4:	Write an exponential function to represent a relationship between two quantities from a graph, a written description or a table of values within a mathematical or real-world context. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, exponential functions are limited to the forms $f(x) = ab^x$, where *b* is a whole number greater than 1 or a unit fraction, or $f(x) = a(1 \pm r)^x$, where $0 < r < 1$. *Clarification 2:* Within the Algebra 1 course, tables are limited to having successive nonnegative integer inputs so that the function may be determined by finding ratios between successive outputs.
MA.912.AR.5.6:	Given a table, equation or written description of an exponential function, graph that function and determine its key features. **Clarifications:** *Clarification 1:* Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; constant percent rate of change; end behavior and asymptotes. *Clarification 2:* Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation. *Clarification 3:* Within the Algebra 1 course, notations for domain and range are limited to inequality and set-builder. *Clarification 4:* Within the Algebra 1 course, exponential functions are limited to the forms $f(x) = ab^x$, where *b* is a whole number greater than 1 or a unit fraction or $f(x) = a(1 \pm r)^x$, where $0 < r < 1$.
MA.912.AR.5.7:	Solve and graph mathematical and real-world problems that are modeled with exponential functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; constant percent rate of change; end behavior and asymptotes. *Clarification 2*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation. *Clarification 3*: Instruction includes understanding that when the logarithm of the dependent variable is taken and graphed, the exponential function will be transformed into a linear function. *Clarification 4*: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.5.8:	Given a table, equation or written description of a logarithmic function, graph that function and determine its key features. **Clarifications:** *Clarification 1:* Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior; and asymptotes. *Clarification 2:* Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation.
MA.912.AR.5.9:	Solve and graph mathematical and real-world problems that are modeled with logarithmic functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior; and asymptotes. *Clarification 2*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation.
MA.912.AR.7.1:	Solve one-variable radical equations. Interpret solutions as viable in terms of context and identify any extraneous solutions.
MA.912.AR.8.1:	Write and solve one-variable rational equations. Interpret solutions as viable in terms of the context and identify any extraneous solutions. **Clarifications:** *Clarification 1*: Within the Algebra 2 course, numerators and denominators are limited to linear and quadratic expressions.
MA.912.AR.9.4:	Graph the solution set of a system of two-variable linear inequalities. **Clarifications:** *Clarification 1:* Instruction includes cases where one variable has a coefficient of zero. *Clarification 2:* Within the Algebra 1 course, the system is limited to two inequalities.
MA.912.AR.9.6:	Given a real-world context, represent constraints as systems of linear equations or inequalities. Interpret solutions to problems as viable or non-viable options. **Clarifications:** *Clarification 1*: Instruction focuses on analyzing a given function that models a real-world situation and writing constraints that are represented as linear equations or linear inequalities.
MA.912.AR.9.10:	Solve and graph mathematical and real-world problems that are modeled with piecewise functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain, range, intercepts, asymptotes and end behavior. *Clarification 2*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder

	notation.
MA.912.F.1.1:	Given an equation or graph that defines a function, determine the function type. Given an input-output table, determine a function type that could represent it. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, functions represented as tables are limited to linear, quadratic and exponential. *Clarification 2:* Within the Algebra 1 course, functions represented as equations or graphs are limited to vertical or horizontal translations or reflections over the x-axis of the following parent functions: $f(x)=x$, $f(x)=x^2$, $f(x)=x^3$, $f(x)=\sqrt{x}$, $f(x)=\sqrt[3]{x}$, $f(x)=\lvert x \rvert$, $f(x)=2^x$ and $f(x)=\left(\frac{1}{2}\right)^x$.
MA.912.F.1.2:	Given a function represented in function notation, evaluate the function for an input in its domain. For a real-world context, interpret the output. **Clarifications:** *Clarification 1*: Problems include simple functions in two-variables, such as f(x,y)=3x-2y. *Clarification 2*: Within the Algebra 1 course, functions are limited to one-variable such as f(x)=3x.
MA.912.F.1.3:	Calculate and interpret the average rate of change of a real-world situation represented graphically, algebraically or in a table over a specified interval. **Clarifications:** *Clarification 1*: Instruction includes making the connection to determining the slope of a particular line segment.
MA.912.F.1.6:	Compare key features of linear and nonlinear functions each represented algebraically, graphically, in tables or written descriptions. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior and asymptotes. *Clarification 2*: Within the Algebra 1 course, functions other than linear, quadratic or exponential must be represented graphically. *Clarification 3*: Within the Algebra 1 course, instruction includes verifying that a quantity increasing exponentially eventually exceeds a quantity increasing linearly or quadratically.
MA.912.F.2.1:	Identify the effect on the graph or table of a given function after replacing *f(x)* by *f(x)+k*,*kf(x)*, *f(kx)* and *f(x+k)* for specific values of *k*. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, functions are limited to linear, quadratic and absolute value. *Clarification 2*: Instruction focuses on including positive and negative values for *k*.
MA.912.F.2.2:	Identify the effect on the graph of a given function of two or more transformations defined by adding a real number to the x- or y- values or multiplying the x- or y- values by a real number.
MA.912.F.2.3:	Given the graph or table of f(x) and the graph or table of f(x)+k,kf(x), f(kx) and f(x+k), state the type of transformation and find the value of the real number k. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, functions are limited to linear, quadratic and absolute value.
MA.912.F.2.4:	Given the graph or table of values of two or more transformations of a function, state the type of transformation and find the values of the real number that defines the transformation.
MA.912.F.2.5:	Given a table, equation or graph that represents a function, create a corresponding table, equation or graph of the transformed function defined by adding a real number to the *x*- or *y*-values or multiplying the *x*- or *y*-values by a real number.
MA.912.F.3.2:	Given a mathematical or real-world context, combine two or more functions, limited to linear, quadratic, exponential and polynomial, using arithmetic operations. When appropriate, include domain restrictions for the new function. **Clarifications:** *Clarification 1*: Instruction includes representing domain restrictions with inequality notation, interval notation or set-builder notation. *Clarification 2*: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.F.3.4:	Represent the composition of two functions algebraically or in a table. Determine the domain and range of the composite function.
MA.912.F.3.6:	Determine whether an inverse function exists by analyzing tables, graphs and equations.
MA.912.F.3.7:	Represent the inverse of a function algebraically, graphically or in a table. Use composition of functions to verify that one function is the inverse of the other. **Clarifications:** *Clarification 1*: Instruction includes the understanding that a logarithmic function is the inverse of an exponential function.
MA.912.NSO.1.1:	Extend previous understanding of the Laws of Exponents to include rational exponents. Apply the Laws of Exponents to evaluate numerical expressions and generate equivalent numerical expressions involving rational exponents. **Clarifications:** *Clarification 1:* Instruction includes the use of technology when appropriate. *Clarification 2:* Refer to the K-12 Formulas (Appendix E) for the Laws of Exponents. *Clarification 3:* Instruction includes converting between expressions involving rational exponents and expressions involving radicals. *Clarification 4:*Within the Mathematics for Data and Financial Literacy course, it is not the expectation to generate equivalent numerical expressions.
MA.912.NSO.1.2:	Generate equivalent algebraic expressions using the properties of exponents.
MA.912.NSO.1.3:	Generate equivalent algebraic expressions involving radicals or rational exponents using the properties of exponents. **Clarifications:** *Clarification 1*: Within the Algebra 2 course, radicands are limited to monomial algebraic expressions.
	Given a numerical logarithmic expression, evaluate and generate equivalent numerical expressions using the properties of logarithms or exponents.

MA.912.NSO.1.6:	**Clarifications:** *Clarification 1*: Within the Mathematics for Data and Financial Literacy Honors course, problem types focus on money and business.
MA.912.NSO.1.7:	Given an algebraic logarithmic expression, generate an equivalent algebraic expression using the properties of logarithms or exponents. **Clarifications:** *Clarification 1*: Within the Mathematics for Data and Financial Literacy Honors course, problem types focus on money and business.
MA.K12.MTR.1.1:	Mathematicians who participate in effortful learning both individually and with others: • Analyze the problem in a way that makes sense given the task. • Ask questions that will help with solving the task. • Build perseverance by modifying methods as needed while solving a challenging task. • Stay engaged and maintain a positive mindset when working to solve tasks. • Help and support each other when attempting a new method or approach. **Clarifications:** Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: • Build understanding through modeling and using manipulatives. • Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. • Progress from modeling problems with objects and drawings to using algorithms and equations. • Express connections between concepts and representations. • Choose a representation based on the given context or purpose. **Clarifications:** Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations. **Clarifications:** Teachers who encourage students to complete tasks with mathematical fluency: • Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. • Offer multiple opportunities for students to practice efficient and generalizable methods. • Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: • Communicate mathematical ideas, vocabulary and methods effectively. • Analyze the mathematical thinking of others. • Compare the efficiency of a method to those expressed by others. • Recognize errors and suggest how to correctly solve the task. • Justify results by explaining methods and processes. • Construct possible arguments based on evidence. **Clarifications:** Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. **Clarifications:**

	Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. **Clarifications:** Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems. • Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. **Clarifications:** Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. **Clarifications:** K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. **Clarifications:** See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. **Clarifications:** Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. **Clarifications:** In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think _______ because ______." The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. **Clarifications:** Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. **Clarifications:** In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends

	differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

General Course Information and Notes

VERSION DESCRIPTION

In Mathematics for College Algebra, instructional time will emphasize five areas: (1) developing fluency with the Laws of Exponents with numerical and algebraic expressions; (2) extending arithmetic operations with algebraic expressions to include rational and polynomial expressions; (3) solving one-variable exponential, logarithmic, radical and rational equations and interpreting the viability of solutions in real-world contexts; (4) modeling with and applying linear, quadratic, absolute value, exponential, logarithmic and piecewise functions and systems of linear equations and inequalities; (5) extending knowledge of functions to include inverse and composition.

All clarifications stated, whether general or specific to Mathematics for College Algebra, are expectations for instruction of that benchmark.

Curricular content for all subjects must integrate critical-thinking, problem-solving, and workforce-literacy skills; communication, reading, and writing skills; mathematics skills; collaboration skills; contextual and applied-learning skills; technology-literacy skills; information and media-literacy skills; and civic-engagement skills.

GENERAL NOTES

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards
This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Number: 1200700

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Algebra >

Abbreviated Title: MATH COLL ALGEBRA

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- Class Size Core Required

Course Type: Core Academic Course

Course Level: 2

Course Status: State Board Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Mathematics

Educator Certifications

Mathematics (Grades 6-12)

Mathematics Transfer (#1200990) 2015 - And Beyond (current)

General Course Information and Notes

VERSION DESCRIPTION

SUBJECT AREA TRANSFER NUMBERS

Each course transferred into a Florida public school by an out-of-state or non-public school student should be matched with a course title and number when such course provides substantially the same content. However, a few transfer courses may not be close enough in content to be matched. For those courses a subject area transfer number is provided.

GENERAL INFORMATION

Course Number: 1200990

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Transfer and CTE Industry Certification Substitutions >

Abbreviated Title: MATH TRAN

Course Length: Not Applicable

Course Type: Transfer Course

Course Status: Course Approved

Grade Level(s): 9,10,11,12

Computer Science Substitution for Mathematics (#1200997) 2020 - And Beyond (current)

General Course Information and Notes

VERSION DESCRIPTION

Section 1007.2616(6)(a), F.S., authorizes the substitution of up to one (1) mathematics credit (MA) and one (1) equally rigorous science (EQ) credit toward high school graduation for a student receiving a passing score on an industry certification examination and using an eligible computer science course containing content related to the course for which it is substituting. A listing of eligible computer science courses for the current school year is posted at https://www.fldoe.org/core/fileparse.php/7746/urlt/1819CompSci.pdf.

The school district would determine which industry certification exams (passing scores) can yield course substitutions for mathematics and science. It is important to note that one qualifying industry certification attainment equates to one substitution credit. A student would need to earn two distinct industry certifications tied to college credit in order to earn the maximum two substitution credits (one for math, one for science). The eligible industry certifications that are tied to statewide college credit may be found at https://www.fldoe.org/academics/career-adult-edu/career-technical-edu-agreements/industry-certification.stml.

Per statute, the substitution does not apply to Algebra 1, Geometry or higher-level mathematics courses; higher-level courses are Level 3 courses in the Florida Course Code Directory.

Students who receive a course substitution earn course credit counted toward high school graduation. A course substitution does not factor into a student's grade point average (GPA).

Please note that course substitutions may not meet State University System (SUS) admission requirements or state scholarship program requirements.

QUALIFICATIONS

not applicable

GENERAL INFORMATION

Course Number: 1200997

Course Path: **Section:** Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Transfer and CTE Industry Certification Substitutions >

Abbreviated Title: COMP SCI SUB MATH

Course Length: Not Applicable

Course Type: Course Substitution

Course Status: Course Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Mathematics

Industry Certification Mathematics Substitution1 (#1200998) 2015 - And Beyond (current)

Course Standards

Name	Description
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

VERSION DESCRIPTION

Section 1003.4282, F.S., authorizes the substitution of up to two (2) mathematics credits (MA) toward high school graduation for a student receiving a passing score on an industry certification examination. Only one substitution per industry certification attained is allowed.

The school district would determine which industry certification exams (passing scores) can yield course substitutions for mathematics. It is important to note that one qualifying industry certification attainment equates to one substitution credit. A student would need to earn two distinct industry certifications tied to college credit in order to earn the maximum two substitution credits in Mathematics. The eligible industry certifications that are tied to statewide college credit may be found at https://www.fldoe.org/academics/career-adult-edu/career-technical-edu-agreements/industry-certification.stml.

Students who receive a course substitution earn course credit counted toward high school graduation. A course substitution does not factor into a student's grade point average (GPA).

GENERAL NOTES

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

GENERAL INFORMATION

Course Number: 1200998

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Transfer and CTE Industry Certification Substitutions >

Abbreviated Title: CTEIC MATH SUB 1

Course Length: Not Applicable

Course Type: Course Substitution

Course Status: Draft - Course Pending Approval

Graduation Requirement: Mathematics

Industry Certification Mathematics Substitution 2 (#1200999) 2015 - And Beyond (current)

Course Standards

Name	Description
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

VERSION DESCRIPTION

Course Substitutions

Section 1003.4282, F.S., authorizes the substitution of up to two (2) mathematics credits (MA) toward high school graduation for a student receiving a passing score on an industry certification examination. Only one substitution per industry certification attained is allowed.

The school district would determine which industry certification exams (passing scores) can yield course substitutions for mathematics. It is important to note that one qualifying industry certification attainment equates to one substitution credit. A student would need to earn two distinct industry certifications tied to college credit in order to earn the maximum two substitution credits in Mathematics. The eligible industry certifications that are tied to statewide college credit may be found at https://www.fldoe.org/academics/career-adult-edu/career-technical-edu-agreements/industry-certification.stml.

Students who receive a course substitution earn course credit counted toward high school graduation. A course substitution does not factor into a student’s grade point average (GPA).

GENERAL NOTES

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL’s need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

GENERAL INFORMATION

Course Number: 1200999

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Transfer and CTE Industry Certification Substitutions >

Abbreviated Title: CTE/IC MATH SUB 2

Course Length: Not Applicable

Course Type: Course Substitution

Course Status: Draft - Course Pending Approval

Graduation Requirement: Mathematics

International Baccalaureate Mathematics: Analysis and Approaches 1 (#1201325) 2019 - And Beyond (current)

General Course Information and Notes

VERSION DESCRIPTION

The curriculum description for this IB course is provided at http://www.ibo.org/en/programmes/.

GENERAL INFORMATION

Course Number: 1201325

Course Path: **Section:** Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Mathematical Analysis >

Abbreviated Title: IB MATH: ANLYS/APPR1

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- International Baccalaureate (IB)

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Mathematics

Educator Certifications

Mathematics (Grades 6-12)

International Baccalaureate Mathematics: Analysis and Approaches 2 (#1201330) 2019 - And Beyond (current)

General Course Information and Notes

VERSION DESCRIPTION

The curriculum description for this IB course is provided at http://www.ibo.org/en/programmes/.

GENERAL INFORMATION

Course Number: 1201330

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Mathematical Analysis >

Abbreviated Title: IB MATH: ANLYS/APPR2

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- International Baccalaureate (IB)

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Mathematics

Educator Certifications

Mathematics (Grades 6-12)

International Baccalaureate Mathematics: Analysis and Approaches 3 (#1201335) 2019 - And Beyond (current)

General Course Information and Notes

VERSION DESCRIPTION

The curriculum description for this IB course is provided at http://www.ibo.org/en/programmes/.

GENERAL INFORMATION

Course Number: 1201335

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Mathematical Analysis >

Abbreviated Title: IB MATH: ANLYS/APPR3

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- International Baccalaureate (IB)

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 9,10,11,12

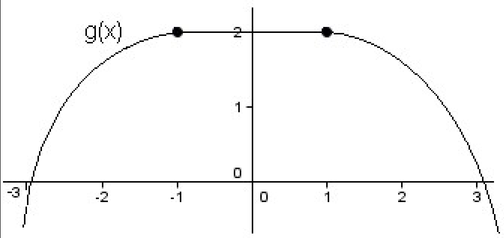
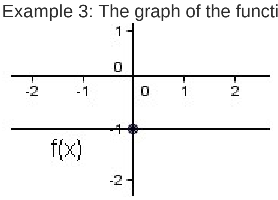
Graduation Requirement: Mathematics

Educator Certifications

Mathematics (Grades 6-12)

Calculus Honors (#1202300) 2015 - 2022 (current)

Course Standards

Name	Description
MAFS.912.C.1.6:	Find limits at infinity. **Clarifications:** Example 1: Find $\lim\limits_{x\to\infty} \frac{x}{x-1}$ Example 2: Find $\lim\limits_{x\to\infty} (2x^3 - 500x^2)$ Example 3: Find $\lim\limits_{x\to-\infty} \frac{x^3 - x + 10}{x^4 - 8}$
MAFS.912.C.1.7:	Decide when a limit is infinite and use limits involving infinity to describe asymptotic behavior. **Clarifications:** Example 1: Find $\lim\limits_{x\to 0} \frac{x^2 - 3x}{x^2}$ Example 2: Where does the following function have asymptote(s)? Explain your answer. $f(x) = \frac{1}{x^2 - 7x + 10}$
MAFS.912.C.1.8:	Find special limits such as $\lim\limits_{x\to 0} \frac{sinx}{x}$ **Clarifications:** Example: Use a diagram to show that $\lim\limits_{x\to 0} \frac{sinx}{x}$ is equal to 1.
MAFS.912.C.2.1:	Understand the concept of derivative geometrically, numerically, and analytically, and interpret the derivative as an instantaneous rate of change or as the slope of the tangent line. **Clarifications:** Example: Approximate the derivative of $f(x) = x^2$ at x=5 by calculating values of $\frac{f(x+h) - f(x)}{h}$ for values of h that are very close to zero. Use a diagram to explain what you are doing and what the result means.
MAFS.912.C.2.2:	State, understand, and apply the definition of derivative. **Clarifications:** Example 1 (related to the example given in C.2.1):Find $\lim\limits_{h\to 0} \frac{(5+h)^2 - 5^2}{h}$. What does the result tell you? Use the limit given above to determine the derivative function for f(x). In other words calculate f '(x) = $\lim\limits_{h\to 0} \frac{f(x+h) - f(x)}{h}$ for $f(x) = x^2$. Example 2: For the function g(x), shown on the graph, draw the graph of g'(x) by estimation. Explain how you arrived at your solution.  Example 3: The graph of the function f(x) is given below. Find a function g(x) such that the derivative of g(x) will be f(x). Explain your solution. 
MAFS.912.C.2.3:	Find the derivatives of functions, including algebraic, trigonometric, logarithmic, and exponential functions. **Clarifications:** Example 1: Find $\frac{dy}{dx}$ for the function $y = x^2$.

	Example 2: Find $\frac{dy}{dx}$ for the function y = ln(x).
MAFS.912.C.2.4:	Find the derivatives of sums, products, and quotients. **Clarifications:** Example 1: Find the derivative of the function f(x)= xcos(x). Example 2: Using the quotient rule for derivatives, show that the derivative of f(x) = tan(x) is f '(x) = $\sec^2(x)$.
MAFS.912.C.2.5:	Find the derivatives of composite functions using the Chain Rule. **Clarifications:** Example 1: Find $f'(x)$ for $f(x) = (x^2+2)^2$. Example 2: Find $f'(x)$ for $f(x) = \sin(\frac{1}{x})$.
MAFS.912.C.2.6:	Find the derivatives of implicitly-defined functions. **Clarifications:** Example: For the equation $xy - x^2y^2 = 5$, find $\frac{dy}{dx}$ at the point (2, 3).
MAFS.912.C.2.7:	Find derivatives of inverse functions. **Clarifications:** Example: Let $f(x) = 2x^3$ and $g(x) = f^{-1}(x)$ find $g'(2)$.
MAFS.912.C.2.8:	Find second derivatives and derivatives of higher order. **Clarifications:** Example: Let $f(x) = e^{5x}$. Find $f''(x)$ and $f'''(x)$.
MAFS.912.C.2.9:	Find derivatives using logarithmic differentiation. **Clarifications:** Example 1: Find $\frac{dy}{dx}$ for the following equation: $y = \sqrt{(x+3)^3(x-7)}$. Example 2: Find the derivative of $f(x) = (3x^2+5)^x$.
MAFS.912.C.2.10:	Understand and use the relationship between differentiability and continuity. **Clarifications:** Example 1: Let f(x)=1/x. Is f(x) continuous at x = 0? Is f(x) differentiable at x = 0? Explain your answers. Example 2: Is f(x) = IxI continuous at x=0? Is f(x) differentiable at x=0? Explain your answers.
MAFS.912.C.2.11:	Understand and apply the Mean Value Theorem. **Clarifications:** Example 1: Let $f(x) = \sqrt{x}$. On the interval [1, 9], find the value of c such that $\frac{f(9)-f(1)}{9-1} = f'(c)$. Example 2: At a car race, two cars join the race at the same point at the same time. They finish the race in a tie. Prove that some time during the race, the two cars had exactly the same speed. (Hint: Define f(t), g(t), and h(t), where f(t) is the distance that car 1 has traveled at time t, g(t) is the distance that car 2 has travelled at time t, and h(t) = f(t) - g(t).)
MAFS.912.C.3.1:	Find the slope of a curve at a point, including points at which there are vertical tangent lines and no tangent lines. **Clarifications:** Example 1: Find the slope of the line tangent to the graph of the equation $y = x^3$ at the point (2, 8). Example 2: Find the slope of the line tangent to the graph of the function $f(x) = \sqrt[3]{(1-x)}$ at x=1. Explain your answer. Example 3: Find the slope of the line tangent to the graph of the function $f(x) = \lvert x^3 - 8 \rvert$ at x=2. Explain your answer.
MAFS.912.C.3.2:	Find an equation for the tangent line to a curve at a point and a local linear approximation. **Clarifications:** Example 1: Find an equation of the line tangent to the graph of the equation $y = x^3$ at the point (2, 8). Example 2: Use a local linear approximation to estimate the derivative of $f(x) = x^x$ at x=2.
MAFS.912.C.3.3:	Decide where functions are decreasing and increasing. Understand the relationship between the increasing and decreasing behavior of *f* and the sign of *f'*. **Clarifications:** Example 1: For what values of x, is the function $f(x) = \frac{x}{x^2+1}$ decreasing? Example 2: The weight of a new infant baby during the first two months can be modeled by the following function: $w = \frac{1}{4}t^3 + \frac{5}{2}t^2 - \frac{19}{6}t + 8$, w represents weight in pounds, and t represents time in months. When is the infant gaining weight or losing weight during the first two months? Explain your answer.

MAFS.912.C.3.4:	Find local and absolute maximum and minimum points. **Clarifications:** Example 1: For the graph of the function $f(x) = x^3 - 3x$ find the local maximum and local minimum points of f(x) on [-2, 3].
MAFS.912.C.3.5:	Find points of inflection of functions. Understand the relationship between the concavity of f and the sign of f". Understand points of inflection as places where concavity changes. **Clarifications:** Example: For the graph of the function $f(x) = x^3 - 3x$ find the points of inflection of f(x) and determine where f(x) is concave upward and concave downward.
MAFS.912.C.3.6:	Use first and second derivatives to help sketch graphs. Compare the corresponding characteristics of the graphs of f, f', and f". **Clarifications:** Example: Use information from the first and second derivatives to sketch the graph of $f(x) = x^4 + 3x^2 - 2x + 1$.
MAFS.912.C.3.7:	Use implicit differentiation to find the derivative of an inverse function. **Clarifications:** Example: Let $f(x) = 2x^3$ and $g(x) = f^{-1}(x)$ find g'(x) using implicit differentiation.
MAFS.912.C.3.8:	Solve optimization problems. **Clarifications:** Example 1: You want to enclose a rectangular field with an area of $5,000m^2$. Find the shortest length of fencing you can use. Example 2: The sum of the perimeters of an equilateral triangle and a square is 20. Find the dimensions of each that will produce the least area.
MAFS.912.C.3.9:	Find average and instantaneous rates of change. Understand the instantaneous rate of change as the limit of the average rate of change. Interpret a derivative as a rate of change in applications, including velocity, speed, and acceleration. **Clarifications:** Example: The vertical distance traveled by an object within the earth's gravitational field (and neglecting air resistance) is given by the equation $x(t) = \frac{1}{2}gt^2 + v_0t + x_0$, where g is the force on the object due to earth's gravity, V_0 is the initial velocity, X_0 is the initial height above the ground, t is the time in seconds, and down is the negative vertical direction. Determine the instantaneous speed and the average speed for an object, initially at rest, 3 seconds after it is dropped from a 100m tall cliff. What about 5 seconds after?. Use $g = -10\frac{m}{s^2}$.
MAFS.912.C.3.10:	Find the velocity and acceleration of a particle moving in a straight line. **Clarifications:** Example: A bead on a wire moves so that, after t seconds, its distance s cm from the midpoint of the wire is given by $s = 5sin(t - \pi/4)$. find its maximum velocity and where along the wire this occurs.
MAFS.912.C.3.11:	Model rates of change, including related rates problems. **Clarifications:** Example: One boat is heading due south at 10 mph. Another boat is heading due west at 15 mph. Both boats are heading toward the same point. If the boats maintain their speeds and directions, they will meet in two hours. Find the rate (in miles per hour) that the distance between them is decreasing exactly one hour before they meet.
MAFS.912.C.4.1:	Use rectangle approximations to find approximate values of integrals. **Clarifications:** Example: Find an approximate value for $\int_0^3 x^2 dx$ using 6 rectangles of equal width under the graph of $f(x) = x^2$ between x=0 and x=3. How did you form your rectangles? Compute this approximation three times using at least three different methods to form the rectangles.
MAFS.912.C.4.2:	Calculate the values of Riemann Sums over equal subdivisions using left, right, and midpoint evaluation points. **Clarifications:** Example 1: Find the value of the Riemann Sum over the interval [0, 1] using 6 subintervals of equal width for $f(x) = e^x$ evaluated at the midpoint of each subinterval. Example 2: Estimate $\int_0^\pi \sin x\, dx$ using a Riemann midpoint sum with 4 subintervals.
MAFS.912.C.4.3:	Interpret a definite integral as a limit of Riemann sums. **Clarifications:** Example: Find the values of the Riemann sums over the interval [0, 1] using 12 and 24 subintervals of equal width for $f(x) = e^x$ evaluated at the midpoint of each subinterval. Write an expression for the Riemann sums using n intervals of equal width. Find the limit of this Riemann Sums as n goes to infinity.
MAFS.912.C.4.4:	Interpret a definite integral of the rate of change of a quantity over an interval as the change of the quantity over the interval. That is, $f(x) = e^x$ *f'*(*x*)*dx* = *f*(*b*) - *f*(*a*) (fundamental theorem of calculus). **Clarifications:** Example: Explain why $\int_4^5 2x dx = 5^2 - 4^2$.

MAFS.912.C.4.5:

Use the Fundamental Theorem of Calculus to evaluate definite and indefinite integrals and to represent particular antiderivatives. Perform analytical and graphical analysis of functions so defined.

Clarifications:
Example 1: Using antiderivatives, find

$$\int_0^3 x^2 dx$$

Example 2: Evaluate

$$\int_1^5 e^x dx$$

Example 3: Find

$$\int \sqrt{x} dx$$

MAFS.912.C.4.6:

Use these properties of definite integrals:

- ∫[f(x) + g(x)]dx = ∫f(x)dx + ∫g(x)dx
- ∫k • f(x)dx = k ∫f(x)dx
- ∫f(x)dx = 0
- ∫f(x)dx = - ∫f(x)dx
- ∫f(x)dx + ∫f(x)dx = ∫f(x)dx
- If f(x) ≤ g(x) on [a, b], then ∫f(x)dx ≤ ∫g(x)dx

Clarifications:
Example 1: Given $\int_0^3 5f(x)dx$ and $\int_{-3}^0 f(x)dx = -9$, find $\int_0^3 5f(x)dx$, $\int_{-3}^3 f(x)dx$, and $\int_0^3 [f(x)+2]dx$.

Example 2: Evaluate

$$\int_0^{2\pi} (\sin x + \cos x)dx$$

MAFS.912.C.4.7:

Use integration by substitution (or change of variable) to find values of integrals.

Clarifications:
Example: Find $\int x^2(x^3+1)^4 dx$

MAFS.912.C.4.8:

Use Riemann Sums, the Trapezoidal Rule, and technology to approximate definite integrals of functions represented algebraically, geometrically, and by tables of values.

Clarifications:
Example 1: Use the Trapezoidal Rule with 6 subintervals over [0, 3] for $f(x) = x^2$ to approximate the value of $\int_0^3 x^2 dx$.

Example 2: Find an approximation to

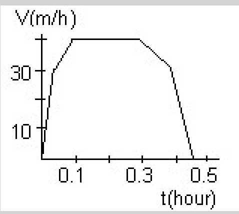
$$\int_{-3}^0 \sqrt{9-x^2}\, dx$$

MAFS.912.C.5.1:

Find specific antiderivatives using initial conditions, including finding velocity functions from acceleration functions, finding position functions from velocity functions, and solving applications related to motion along a line.

Clarifications:
Example 1: A bead on a wire moves so that its velocity (in cm/s), after t seconds, is given by v(t) = 3 cos 3t. Given that it starts 2 cm to the left of the midpoint of the wire, find its position after 5 seconds.

Example 2: Carla recorded their car's speed during their trip from school to home. She plotted the data and obtained the following graph. What might the graph for distance versus time look like for their trip to home? Label the axes of your graph and explain why you think it might be a correct representation of the distance versus time for their trip.



MAFS.912.C.5.5:

Use definite integrals to find the area between a curve and the x-axis or between two curves.

Clarifications:
Example: Find the area bounded by $y = \sqrt{x}$, y= 0, and x = 2.

MAFS.912.C.5.7:

Use definite integrals to find the volume of a solid with known cross-sectional area, including solids of revolution.

Clarifications:
Example 1: A cone with its vertex at the origin lies symmetrically along the x-axis. The base of the cone is at x = 5 and the base radius is 7. Use integration to find the volume of the cone.

	Example 2: What is the volume of the solid created when the area between the curves $f(x) = x$ and $g(x) = x^2$ for $0 \le x \le 1$ is revolved around the y-axis?
MAFS.912.C.5.8:	Apply integration to model, and solve problems in physical, biological, and social sciences. **Clarifications:** Example: During an acceleration trial, a test vehicle traveling in a straight line has a velocity given by the equation v(t)=sin t , where t is in seconds and velocity is in feet per second. Find the total distance traveled by the test car during the time interval from 0 seconds to 1.5 seconds.
MAFS.K12.MP.1.1:	**Make sense of problems and persevere in solving them.** Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
MAFS.K12.MP.2.1:	**Reason abstractly and quantitatively**. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
MAFS.K12.MP.3.1:	**Construct viable arguments and critique the reasoning of others.** Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
MAFS.K12.MP.4.1:	**Model with mathematics.** Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
MAFS.K12.MP.5.1:	**Use appropriate tools strategically.** Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
MAFS.K12.MP.6.1:	**Attend to precision.** Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
MAFS.K12.MP.7.1:	**Look for and make use of structure.** Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.

MAFS.K12.MP.8.1:	**Look for and express regularity in repeated reasoning.** Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
LAFS.1112.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
LAFS.1112.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
LAFS.1112.RST.3.7:	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
LAFS.1112.SL.1.1:	Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
LAFS.1112.SL.1.2:	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
LAFS.1112.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.
LAFS.1112.SL.2.4:	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
LAFS.1112.WHST.1.1:	Write arguments focused on *discipline-specific content.* a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.1112.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.1112.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

GENERAL NOTES

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:
https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Number: 1202300	**Course Path: Section:** Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Calculus >
	Abbreviated Title: CALCULUS HON
Number of Credits: One (1) credit	**Course Length:** Year (Y)
	Course Attributes: • Honors
Course Type: Core Academic Course	**Course Level:** 3
Course Status: Course Approved	
Grade Level(s): 9,10,11,12	
Graduation Requirement: Mathematics	

Educator Certifications

Mathematics (Grades 6-12)

Calculus Honors (#1202300) 2022 - And Beyond

Course Standards

Name	Description
MA.912.C.1.1:	Demonstrate understanding of the concept of a limit and estimate limits from graphs and tables of values.
MA.912.C.1.2:	Determine the value of a limit if it exists algebraically using limits of sums, differences, products, quotients and compositions of continuous functions.
MA.912.C.1.3:	Find limits of rational functions that are undefined at a point.
MA.912.C.1.4:	Find one-sided limits.
MA.912.C.1.5:	Find limits at infinity.
MA.912.C.1.6:	Decide when a limit is infinite and use limits involving infinity to describe asymptotic behavior.
MA.912.C.1.7:	Find special limits by using the Squeeze Theorem or algebraic manipulation.
MA.912.C.1.8:	Find limits of indeterminate forms using L'Hôpital's Rule.
MA.912.C.1.9:	Define continuity in terms of limits.
MA.912.C.1.10:	Given the graph of a function, identify whether a function is continuous at a point. If not, identify the type of discontinuity for the given function.
MA.912.C.1.11:	Apply the Intermediate Value Theorem and the Extreme Value Theorem.
MA.912.C.2.1:	State, understand and apply the definition of derivative. Apply and interpret derivatives geometrically and numerically.
MA.912.C.2.2:	Interpret the derivative as an instantaneous rate of change or as the slope of the tangent line.
MA.912.C.2.3:	Prove the rules for finding derivatives of constants, sums, products, quotients and the Chain Rule. **Clarifications:** *Clarification 1*: Special cases of rules include a constant multiple of a function and the power of a function.
MA.912.C.2.4:	Apply the rules for finding derivatives of constants, sums, products, quotients and the Chain Rule to solve problems with functions limited to algebraic, trigonometric, inverse trigonometric, logarithmic and exponential. **Clarifications:** *Clarification 1*: Special cases of rules include a constant multiple of a function and the power of a function.
MA.912.C.2.5:	Find the derivatives of implicitly defined functions.
MA.912.C.2.6:	Find derivatives of inverse functions.
MA.912.C.2.7:	Find second derivatives and derivatives of higher order.
MA.912.C.2.8:	Find derivatives using logarithmic differentiation.
MA.912.C.2.9:	Demonstrate and use the relationship between differentiability and continuity.
MA.912.C.2.10:	Apply the Mean Value Theorem.
MA.912.C.3.1:	Find the slope of a curve at a point, including points at which there are vertical tangent lines.
MA.912.C.3.2:	Find an equation for the tangent line to a curve at a point and use it to make local linear approximation.
MA.912.C.3.3:	Determine where a function is decreasing and increasing using its derivative.
MA.912.C.3.4:	Find local and absolute maximum and minimum points of a function.
MA.912.C.3.5:	Determine the concavity and points of inflection of a function using its second derivative.
MA.912.C.3.6:	Sketch graphs by using first and second derivatives. Compare the corresponding characteristics of the graphs of f, f' and f".
MA.912.C.3.7:	Solve optimization problems using derivatives.
MA.912.C.3.8:	Find average and instantaneous rates of change. Explain the instantaneous rate of change as the limit of the average rate of change. Interpret a derivative as a rate of change in applications, including velocity, speed and acceleration.
MA.912.C.3.9:	Find the velocity and acceleration of a particle moving in a straight line.
MA.912.C.3.10:	Model and solve problems involving rates of change, including related rates.
MA.912.C.4.1:	Interpret a definite integral as a limit of Riemann sums. Calculate the values of Riemann sums over equal subdivisions using left, right and midpoint evaluation points.
MA.912.C.4.2:	Apply Riemann sums, the Trapezoidal Rule and technology to approximate definite integrals of functions represented algebraically, geometrically and by tables of values.
MA.912.C.4.3:	Interpret a definite integral of the rate of change of a quantity over an interval as the change of the quantity over the interval. **Clarifications:** *Clarification 1*: Instruction focuses on the relationship $\int_a^b f'(x)dx = f(b) - f(a)$ which is the Fundamental Theorem of Calculus.
MA.912.C.4.4:	Evaluate definite integrals by using the Fundamental Theorem of Calculus.
MA.912.C.4.5:	Analyze function graphs by using derivative graphs and the Fundamental Theorem of Calculus.
MA.912.C.4.6:	Evaluate or solve problems using the properties of definite integrals. Properties are limited to the following: • $\int_a^b [f(x) + g(x)]dx = \int_a^b f(x)dx + \int_a^b g(x)dx$ • $\int_a^b k \cdot f(x)dx = k\int_a^b f(x)dx$ • $\int_a^a f(x)dx = 0$ • $\int_a^b f(x)dx = -\int_b^a f(x)dx$ • $\int_a^b f(x)dx + \int_b^c f(x)dx = \int_a^c f(x)dx$ • If $f(x) \leq g(x)$ on $[a,b]$, then $\int_a^b f(x)dx \leq \int_a^b g(x)dx$.
MA.912.C.4.7:	Evaluate definite and indefinite integrals by using integration by substitution.

MA.912.C.5.1:	Find specific antiderivatives using initial conditions, including finding velocity functions from acceleration functions, finding position functions from velocity functions and solving applications related to motion along a line.
MA.912.C.5.2:	Solve separable differential equations.
MA.912.C.5.3:	Solve differential equations of the form $\frac{dy}{dt} = ky$ as applied to growth and decay problems.
MA.912.C.5.4:	Display a graphic representation of the solution to a differential equation by using slope fields, and locate particular solutions to the equation.
MA.912.C.5.5:	Find the area between a curve and the x-axis or between two curves by using definite integrals.
MA.912.C.5.6:	Find the average value of a function over a closed interval by using definite integrals.
MA.912.C.5.7:	Find the volume of a figure with known cross-sectional area, including figures of revolution, by using definite integrals.
MA.K12.MTR.1.1:	Mathematicians who participate in effortful learning both individually and with others: • Analyze the problem in a way that makes sense given the task. • Ask questions that will help with solving the task. • Build perseverance by modifying methods as needed while solving a challenging task. • Stay engaged and maintain a positive mindset when working to solve tasks. • Help and support each other when attempting a new method or approach. **Clarifications:** Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: • Build understanding through modeling and using manipulatives. • Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. • Progress from modeling problems with objects and drawings to using algorithms and equations. • Express connections between concepts and representations. • Choose a representation based on the given context or purpose. **Clarifications:** Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations. **Clarifications:** Teachers who encourage students to complete tasks with mathematical fluency: • Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. • Offer multiple opportunities for students to practice efficient and generalizable methods. • Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: • Communicate mathematical ideas, vocabulary and methods effectively. • Analyze the mathematical thinking of others. • Compare the efficiency of a method to those expressed by others. • Recognize errors and suggest how to correctly solve the task. • Justify results by explaining methods and processes. • Construct possible arguments based on evidence. **Clarifications:** Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers.
	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts.

MA.K12.MTR.5.1:	• Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. **Clarifications:** Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. **Clarifications:** Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems. • Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. **Clarifications:** Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. **Clarifications:** K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. **Clarifications:** See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. **Clarifications:** Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. **Clarifications:** In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think _______ because ______." The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. **Clarifications:** Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.

ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. **Clarifications:** In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

General Course Information and Notes

VERSION DESCRIPTION

In Calculus Honors, instructional time will emphasize four areas: (1) developing understanding of limits and continuity of functions; (2) finding derivatives and applying them to motions, slopes, related rates and optimizations; (3) applying limits and derivatives to graph and analyze functions and (4) evaluating integrals and applying them to areas, volumes, average values and differential equations.

All clarifications stated, whether general or specific to Calculus Honors, are expectations for instruction of that benchmark.

Curricular content for all subjects must integrate critical-thinking, problem-solving, and workforce-literacy skills; communication, reading, and writing skills; mathematics skills; collaboration skills; contextual and applied-learning skills; technology-literacy skills; information and media-literacy skills; and civic-engagement skills.

GENERAL NOTES

Honors and Accelerated Level Course Note: Accelerated courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards
This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Number: 1202300

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Calculus >

Abbreviated Title: CALC H

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:
- Honors
- Class Size Core Required

Course Type: Core Academic Course

Course Level: 3

Course Status: State Board Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Mathematics

Educator Certifications

Mathematics (Grades 6-12)

Advanced Placement Calculus AB (#1202310) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The course description for this Advanced Placement courses is located on the College Board site at http://apcentral.collegeboard.com/apc/public/courses/teachers_corner/index.html.

GENERAL INFORMATION

Course Number: 1202310

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Calculus >

Abbreviated Title: AP CALCULUS AB

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- Advanced Placement (AP)

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Mathematics

Educator Certifications

Mathematics (Grades 6-12)

Advanced Placement Calculus BC (#1202320) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The course description for this Advanced Placement courses is located on the College Board site at http://apcentral.collegeboard.com/apc/public/courses/teachers_corner/index.html.

GENERAL INFORMATION

Course Number: 1202320

Course Path: **Section:** Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Calculus >

Abbreviated Title: AP CALCULUS BC

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- Advanced Placement (AP)

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 9,10,11,12

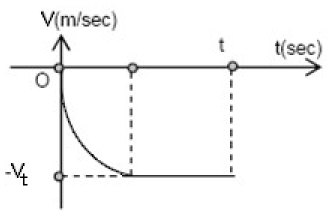
Graduation Requirement: Mathematics

Educator Certifications

Mathematics (Grades 6-12)

Pre-Calculus Honors (#1202340) 2015 - 2022 (current)

Course Standards

Name	Description
MAFS.912.A-APR.3.4:	Prove polynomial identities and use them to describe numerical relationships. For example, the polynomial identity $(x^2 + y^2)^2 = (x^2 – y^2)^2 + (2xy)^2$ can be used to generate Pythagorean triples.
MAFS.912.A-APR.3.5:	Know and apply the Binomial Theorem for the expansion of (x in powers of x and y for a positive integer n, where x and y are any numbers, with coefficients determined for example by pascal's triangle.
MAFS.912.A-APR.4.6:	Rewrite simple rational expressions in different forms; write a(x)/b(x) in the form q(x) + r(x)/b(x), where a(x), b(x), q(x), and r(x) are polynomials with the degree of r(x) less than the degree of b(x), using inspection, long division, or, for the more complicated examples, a computer algebra system.
MAFS.912.A-APR.4.7:	Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.
MAFS.912.C.1.1:	Understand the concept of limit and estimate limits from graphs and tables of values. **Clarifications:** Example 1: For $f(x) = \frac{x^2+2x-8}{x-2}$, estimate $\lim\limits_{x\to 2} \frac{x^2+2x-8}{x-2}$ by calculating the function's values for x = 2.1, 2.01, 2.001 and for x = 1.9, 1.99, 1.999. Explain your answer. Example 2: A dog started to chase Kathy from 100 meters away. The dog runs fast so that every minute, the distance between Kathy and the dog is halved. Make a graph that shows the distance between Kathy and the dog in meters versus the time in minutes. Write a function to determine the distance between Kathy and the dog at any given time. Will the dog ever catch Kathy? Write a statement about the distance between Kathy and the dog as the time increases. Example 3: A skydiver free falls from an airplane. The following graph shows the velocity of the skydiver. The air resistance and the gravity are the two forces that affect the velocity of a falling object. Write a paragraph that explains the graph, including but not limited to how the velocity of the skydiver changes as the time increases. You might read about the concept of terminal velocity to make an accurate explanation of the graph. 
MAFS.912.C.1.2:	Find limits by substitution. **Clarifications:** Example 1: Find $\lim\limits_{x\to 5}(2x+1)$ Example 2: Find $\lim\limits_{x\to 7}(-3x^0)$ Example 3: Find $\lim\limits_{x\to 0}\frac{e^{x^2}}{3x-4}$
MAFS.912.C.1.3:	Find limits of sums, differences, products, and quotients. **Clarifications:** Example: Find $\lim\limits_{x\to\pi}(sinxcosx + tanx)$
MAFS.912.C.1.4:	Find limits of rational functions that are undefined at a point. **Clarifications:** Example 1: Find $\lim\limits_{x\to 2}\frac{x^2+2x-8}{x-2}$ Example 2: The magnitude of the force between two positive charges, q1 and q2 can be described by the following function: $F(r) = k\frac{q_1q_2}{r^2}$, where *k* is a constant, called Coulomb's constant, and *r* is the distance between the two charges. Find $\lim\limits_{r\to 0}F(r)$. Interpret the answer in the context of the force between the two charges.
MAFS.912.C.1.5:	Find one-sided limits. **Clarifications:** Example 1: Find $\lim\limits_{x\to 4^-}\sqrt{4-x}$

	Example 2: Find $\lim_{x \to 1^-} \frac{x^2 - 3x + 2}{\lvert x - 1 \rvert}$
MAFS.912.C.1.9:	Understand continuity in terms of limits. **Clarifications:** Example 1: Show that f(x)=3x + 1 is continuous at x = 2 by finding $\lim_{x \to 2}(3x+1)$ and comparing it with f(2). Example 2: Given that the limg(x) as x approaches to 5 exists, is the statement “g(x) is continuous at x=5” necessarily true? Provide example functions to support your conclusion.
MAFS.912.C.1.10:	Decide if a function is continuous at a point. **Clarifications:** Example: Determine if the function $f(x) = \frac{x^2 + 2x - 8}{x - 2}$ can be made continuous by defining the function with a specific value at x=2.
MAFS.912.C.1.11:	Find the types of discontinuities of a function. **Clarifications:** Example: Suppose h(x) = $f(x) = \frac{x^2 - 5x + 6}{x^2 - 4}$. Identify and categorize any discontinuities in h(x). explain your answer.
MAFS.912.C.1.12:	Understand and use the Intermediate Value Theorem on a function over a closed interval. **Clarifications:** Example 1: Use the Intermediate Value Theorem to show that $g(x) = x^3 + 3x^2 - 9x - 2$ has a zero between x = 0 and x = 3.
MAFS.912.C.1.13:	Understand and apply the Extreme Value Theorem: If f(x) is continuous over a closed interval, then f has a maximum and a minimum on the interval. **Clarifications:** Example: Use the Extreme Value Theorem to decide whether f(x)=tan(x) has a minimum and maximum on the interval $[\frac{-\pi}{4}, \frac{\pi}{4}]$. What about on the interval $[-\pi, \pi]$? explain your reasoning.
MAFS.912.F-BF.1.1:	Write a function that describes a relationship between two quantities. ★ a. Determine an explicit expression, a recursive process, or steps for calculation from a context. b. Combine standard function types using arithmetic operations. *For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.* c. Compose functions. *For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time.*
MAFS.912.F-BF.2.4:	Find inverse functions. a. Solve an equation of the form f(x) = c for a simple function f that has an inverse and write an expression for the inverse. *For example, f(x) =2 x^3 or f(x) = (x+1)/(x–1) for x ≠ 1.* b. Verify by composition that one function is the inverse of another. c. Read values of an inverse function from a graph or a table, given that the function has an inverse. d. Produce an invertible function from a non-invertible function by restricting the domain.
MAFS.912.F-TF.1.1:	Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle; Convert between degrees and radians.
MAFS.912.F-TF.1.2:	Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.
MAFS.912.F-TF.1.3:	Use special triangles to determine geometrically the values of sine, cosine, tangent for π/3, π/4 and π/6, and use the unit circle to express the values of sine, cosine, and tangent for π–x, π+x, and 2π–x in terms of their values for x, where x is any real number.
MAFS.912.F-TF.1.4:	Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.
MAFS.912.F-TF.2.5:	Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline. ★
MAFS.912.F-TF.2.6:	Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed.
MAFS.912.F-TF.2.7:	Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context. ★
MAFS.912.F-TF.3.8:	Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it to calculate trigonometric ratios.
MAFS.912.F-TF.3.9:	Prove the addition and subtraction, half-angle, and double-angle formulas for sine, cosine, and tangent and use these formulas to solve problems.
MAFS.912.G-GPE.1.1:	Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.
MAFS.912.G-GPE.1.2:	Derive the equation of a parabola given a focus and directrix.
MAFS.912.G-GPE.1.3:	Derive the equations of ellipses and hyperbolas given the foci and directrices.
MAFS.912.G-SRT.3.8:	Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. ★
MAFS.912.G-SRT.4.9:	Derive the formula A = 1/2 ab sin(C) for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.
MAFS.912.G-SRT.4.10:	Prove the Laws of Sines and Cosines and use them to solve problems.
MAFS.912.G-SRT.4.11:	Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).
MAFS.912.N-CN.1.3:	Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers.
MAFS.912.N-CN.2.4:	Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers), and explain why the rectangular and polar forms of a given complex number represent the same number.
MAFS.912.N-CN.2.5:	Represent addition, subtraction, multiplication, and conjugation of complex numbers geometrically on the complex plane; use properties of this representation for computation. For example, $(-1 + \sqrt{3} i)^3 = 8$ because $(-1 + \sqrt{3} i)$ has modulus 2 and argument 120°.
MAFS.912.N-CN.3.9:	Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.
MAFS.912.N-VM.1.1:	Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., ***v***, **|v|**, **||v||**, ***v***).

MAFS.912.N-VM.1.2:	Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point.
MAFS.912.N-VM.1.3:	Solve problems involving velocity and other quantities that can be represented by vectors.
MAFS.912.N-VM.2.4:	Add and subtract vectors. a. Add vectors end-to-end, component-wise, and by the parallelogram rule. Understand that the magnitude of a sum of two vectors is typically not the sum of the magnitudes. b. Given two vectors in magnitude and direction form, determine the magnitude and direction of their sum. c. Understand vector subtraction **v** – **w** as **v** + (–**w**), where –**w** is the additive inverse of **w**, with the same magnitude as **w** and pointing in the opposite direction. Represent vector subtraction graphically by connecting the tips in the appropriate order, and perform vector subtraction component-wise.
MAFS.912.N-VM.2.5:	Multiply a vector by a scalar. a. Represent scalar multiplication graphically by scaling vectors and possibly reversing their direction; perform scalar multiplication component-wise, e.g., as c□ = □. b. Compute the magnitude of a scalar multiple c**v** using ||c**v**|| = |c|v. Compute the direction of c**v** knowing that when |c|v ≠ 0, the direction of c**v** is either along **v** (for c > 0) or against **v** (for c < 0).
MAFS.K12.MP.1.1:	**Make sense of problems and persevere in solving them.** Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
MAFS.K12.MP.2.1:	**Reason abstractly and quantitatively**. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
MAFS.K12.MP.3.1:	**Construct viable arguments and critique the reasoning of others.** Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
MAFS.K12.MP.4.1:	**Model with mathematics.** Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
MAFS.K12.MP.5.1:	**Use appropriate tools strategically.** Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
MAFS.K12.MP.6.1:	**Attend to precision.** Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of

	definitions.
MAFS.K12.MP.7.1:	**Look for and make use of structure.** Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
MAFS.K12.MP.8.1:	**Look for and express regularity in repeated reasoning.** Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
LAFS.1112.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
LAFS.1112.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
LAFS.1112.RST.3.7:	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
LAFS.1112.SL.1.1:	Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
LAFS.1112.SL.1.2:	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
LAFS.1112.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.
LAFS.1112.SL.2.4:	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
LAFS.1112.WHST.1.1:	Write arguments focused on *discipline-specific content.* a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.1112.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.1112.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

GENERAL NOTES

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and

concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

Additional Instructional Resources:
A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGI/cms/review.html?Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

Course Number: 1202340

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Calculus >

Abbreviated Title: PRE-CALCULUS HON

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- Honors

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 9,10,11,12,30,31

Graduation Requirement: Mathematics

Educator Certifications

Mathematics (Grades 6-12)

Precalculus Honors (#1202340) 2022 - And Beyond

Course Standards

Name	Description
MA.912.AR.5.7:	Solve and graph mathematical and real-world problems that are modeled with exponential functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; constant percent rate of change; end behavior and asymptotes. *Clarification 2*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation. *Clarification 3*: Instruction includes understanding that when the logarithm of the dependent variable is taken and graphed, the exponential function will be transformed into a linear function. *Clarification 4*: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.5.9:	Solve and graph mathematical and real-world problems that are modeled with logarithmic functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior; and asymptotes. *Clarification 2*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation.
MA.912.AR.6.3:	Explain and apply theorems for polynomials to solve mathematical and real-world problems. **Clarifications:** *Clarification 1*: Theorems include the Factor Theorem and the Fundamental Theorem of Algebra.
MA.912.AR.6.4:	Given a table, equation or written description of a polynomial function of degree 3 or higher, graph that function and determine its key features. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; relative maximums and minimums; symmetry; and end behavior. *Clarification 2*: Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation.
MA.912.AR.6.6:	Solve and graph mathematical and real-world problems that are modeled with polynomial functions of degree 3 or higher. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; relative maximums and minimums; symmetry; and end behavior. *Clarification 2*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation.
MA.912.AR.7.4:	Solve and graph mathematical and real-world problems that are modeled with radical functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior; and relative maximums and minimums. *Clarification 2*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation.
MA.912.AR.8.3:	Solve and graph mathematical and real-world problems that are modeled with rational functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior; and asymptotes. *Clarification 2*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation. *Clarification 3*: Instruction includes using rational functions to represent inverse proportional relationships. *Clarification 4*: Within the Algebra 2 course, numerators and denominators are limited to linear and quadratic expressions.
MA.912.AR.9.3:	Given a mathematical or real-world context, solve a system consisting of two-variable linear or non-linear equations algebraically or graphically. **Clarifications:** *Clarification 1*: Within the Algebra 2 course, non-linear equations are limited to quadratic equations.
	Solve and graph mathematical and real-world problems that are modeled with piecewise functions. Interpret key features and determine constraints in terms of the context.

MA.912.AR.9.10:	**Clarifications:** *Clarification 1*: Key features are limited to domain, range, intercepts, asymptotes and end behavior. *Clarification 2*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation.
MA.912.AR.10.1:	Given a mathematical or real-world context, write and solve problems involving arithmetic sequences.
MA.912.AR.10.2:	Given a mathematical or real-world context, write and solve problems involving geometric sequences.
MA.912.AR.10.3:	Recognize and apply the formula for the sum of a finite arithmetic series to solve mathematical and real-world problems.
MA.912.AR.10.4:	Recognize and apply the formula for the sum of a finite or an infinite geometric series to solve mathematical and real-world problems.
MA.912.AR.10.5:	Given a mathematical or real-world context, write a sequence using function notation, defined explicitly or recursively, to represent relationships between quantities from a written description.
MA.912.F.1.4:	Write an algebraic expression that represents the difference quotient of a function. Calculate the numerical value of the difference quotient at a given pair of points. **Clarifications:** *Clarification 1*: Instruction focuses on making connections between difference quotients and slopes of lines.
MA.912.F.1.7:	Compare key features of two functions each represented algebraically, graphically, in tables or written descriptions. **Clarifications:** *Clarification 1*: Key features include domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior and asymptotes.
MA.912.F.3.3:	Solve mathematical and real-world problems involving functions that have been combined using arithmetic operations.
MA.912.F.3.4:	Represent the composition of two functions algebraically or in a table. Determine the domain and range of the composite function.
MA.912.F.3.5:	Solve mathematical and real-world problems involving composite functions.
MA.912.F.3.7:	Represent the inverse of a function algebraically, graphically or in a table. Use composition of functions to verify that one function is the inverse of the other. **Clarifications:** *Clarification 1*: Instruction includes the understanding that a logarithmic function is the inverse of an exponential function.
MA.912.F.3.8:	Produce an invertible function from a non-invertible function by restricting the domain.
MA.912.F.3.9:	Solve mathematical and real-world problems involving inverse functions.
MA.912.GR.7.1:	Given a conic section, describe how it can result from the slicing of two cones.
MA.912.GR.7.2:	Given a mathematical or real-world context, derive and create the equation of a circle using key features. **Clarifications:** *Clarification 1:* Instruction includes using the Pythagorean Theorem and completing the square. *Clarification 2:* Within the Geometry course, key features are limited to the radius, diameter and the center.
MA.912.GR.7.3:	Graph and solve mathematical and real-world problems that are modeled with an equation of a circle. Determine and interpret key features in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain, range, eccentricity, center and radius. *Clarification 2*: Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation. *Clarification 3*: Within the Geometry course, notations for domain and range are limited to inequality and set-builder.
MA.912.GR.7.4:	Given a mathematical or real-world context, derive and create the equation of a parabola using key features.
MA.912.GR.7.5:	Graph and solve mathematical and real-world problems that are modeled with an equation of a parabola. Determine and interpret key features in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain, range, eccentricity, intercepts, focus, focal width (latus rectum), vertex and directrix. *Clarification 2*: Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation.
MA.912.GR.7.6:	Given a mathematical or real-world context, derive and create the equation of an ellipse using key features.
MA.912.GR.7.7:	Graph and solve mathematical and real-world problems that are modeled with an equation of an ellipse. Determine and interpret key features in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain, range, eccentricity, center, foci, major axis, minor axis and vertices. *Clarification 2*: Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation.
MA.912.GR.7.8:	Given a mathematical or real-world context, derive and create the equation of a hyperbola using key features.
MA.912.GR.7.9:	Graph and solve mathematical and real-world problems that are modeled with an equation of a hyperbola. Determine and interpret key features in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain, range, eccentricity, center, vertices, foci, transverse axis, conjugate axis, asymptotes and directrices. *Clarification 2*: Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation.
MA.912.NSO.2.2:	Represent addition, subtraction, multiplication and conjugation of complex numbers geometrically on the complex plane.
MA.912.NSO.2.3:	Calculate the distance and midpoint between two numbers on the complex coordinate plane.
MA.912.NSO.2.4:	Solve mathematical and real-world problems involving complex numbers represented algebraically or on the coordinate plane.
MA.912.NSO.2.5:	Represent complex numbers on the complex plane in rectangular and polar forms. **Clarifications:** *Clarification 1*: Instruction includes explaining why the rectangular and polar forms of a given complex numbers represent the same number.

MA.912.NSO.2.6:	Rewrite complex numbers to trigonometric form. Multiply complex numbers in trigonometric form.
MA.912.NSO.3.1:	Apply appropriate notation and symbols to represent vectors in the plane as directed line segments. Determine the magnitude and direction of a vector in component form.
MA.912.NSO.3.2:	Represent vectors in component form, linear form or trigonometric form. Rewrite vectors from one form to another.
MA.912.NSO.3.3:	Solve mathematical and real-world problems involving velocity and other quantities that can be represented by vectors.
MA.912.NSO.3.4:	Solve mathematical and real-world problems involving vectors in two dimensions using the dot product and vector projections.
MA.912.NSO.3.6:	Multiply a vector by a scalar algebraically or graphically.
MA.912.NSO.3.7:	Compute the magnitude and direction of a vector scalar multiple.
MA.912.NSO.3.8:	Add and subtract vectors algebraically or graphically.
MA.912.NSO.3.9:	Given the magnitude and direction of two or more vectors, determine the magnitude and direction of their sum.
MA.912.T.1.3:	Apply the Law of Sines and the Law of Cosines to solve mathematical and real-world problems involving triangles.
MA.912.T.1.4:	Solve mathematical problems involving finding the area of a triangle given two sides and the included angle. **Clarifications:** *Clarification 1:* Problems include right triangles, heights inside of a triangle and heights outside of a triangle.
MA.912.T.1.5:	Prove Pythagorean Identities. Apply Pythagorean Identities to calculate trigonometric ratios and to solve problems.
MA.912.T.1.6:	Prove the Double-Angle, Half-Angle, Angle Sum and Difference formulas for sine, cosine, and tangent. Apply these formulas to solve problems.
MA.912.T.1.7:	Simplify expressions using trigonometric identities. **Clarifications:** *Clarification 1:* Identities are limited to Double-Angle, Half-Angle, Angle Sum and Difference, Pythagorean Identities, Sum Identities and Product Identities.
MA.912.T.1.8:	Solve mathematical and real-world problems involving one-variable trigonometric ratios.
MA.912.T.2.1:	Given any positive or negative angle measure in degrees or radians, identify its corresponding angle measure between 0° and 360° or between 0 and 2π. Convert between degrees and radians.
MA.912.T.2.2:	Define the six basic trigonometric functions for all real numbers by identifying corresponding angle measures and using right triangles drawn in the unit circle.
MA.912.T.2.3:	Determine the values of the six basic trigonometric functions for $0, \frac{\pi}{6}, \frac{\pi}{3}$ and $\frac{\pi}{4}$ and their multiples using special triangles.
MA.912.T.2.4:	Use the unit circle to express the values of sine, cosine and tangent for $\pi-x$, $\pi+x$, and $2\pi-x$ in terms of their values for x, where x is any real number.
MA.912.T.2.5:	Given angles measured in radians or degrees, calculate the values of the six basic trigonometric functions using the unit circle, trigonometric identities or technology.
MA.912.T.3.1:	Given a mathematical or real-world context, choose sine, cosine or tangent trigonometric functions to model periodic phenomena with specified amplitude, frequency, horizontal shift and midline.
MA.912.T.3.2:	Given a table, equation or written description of a trigonometric function, graph that function and determine key features. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; relative maximums and minimums; symmetry; end behavior; periodicity; midline; amplitude; shift(s) and asymptotes. *Clarification 2*: Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation.
MA.912.T.3.3:	Solve and graph mathematical and real-world problems that are modeled with trigonometric functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; relative maximums and minimums; symmetry; end behavior; periodicity; midline; amplitude; shift(s) and asymptotes. *Clarification 2*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation. *Clarification 3*: Instruction includes using technology when appropriate.
MA.912.T.4.1:	Define and plot polar coordinates. Convert between polar coordinates and rectangular coordinates with and without the use of technology.
MA.912.T.4.2:	Represent equations given in rectangular coordinates in terms of polar coordinates. Represent equations given in polar coordinates in terms of rectangular coordinates.
MA.912.T.4.3:	Graph equations in the polar coordinate plane with and without the use of graphing technology.
MA.912.T.4.4:	Identify and graph special polar equations, including circles, cardioids, limacons, rose curves and lemniscates.
MA.912.T.4.5:	Sketch the graph of a curve in the plane represented parametrically, indicating the direction of motion.
MA.912.T.4.6:	Convert from a parametric representation of a plane curve to a rectangular equation, and convert from a rectangular equation to a parametric representation of a plane curve.
MA.912.T.4.7:	Apply parametric equations to model applications involving motion in the plane.
MA.K12.MTR.1.1:	Mathematicians who participate in effortful learning both individually and with others: • Analyze the problem in a way that makes sense given the task. • Ask questions that will help with solving the task. • Build perseverance by modifying methods as needed while solving a challenging task. • Stay engaged and maintain a positive mindset when working to solve tasks. • Help and support each other when attempting a new method or approach. **Clarifications:** Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.
	Demonstrate understanding by representing problems in multiple ways.

MA.K12.MTR.2.1:	Mathematicians who demonstrate understanding by representing problems in multiple ways: • Build understanding through modeling and using manipulatives. • Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. • Progress from modeling problems with objects and drawings to using algorithms and equations. • Express connections between concepts and representations. • Choose a representation based on the given context or purpose. **Clarifications:** Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations. **Clarifications:** Teachers who encourage students to complete tasks with mathematical fluency: • Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. • Offer multiple opportunities for students to practice efficient and generalizable methods. • Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: • Communicate mathematical ideas, vocabulary and methods effectively. • Analyze the mathematical thinking of others. • Compare the efficiency of a method to those expressed by others. • Recognize errors and suggest how to correctly solve the task. • Justify results by explaining methods and processes. • Construct possible arguments based on evidence. **Clarifications:** Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. **Clarifications:** Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. **Clarifications:** Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.

MA.K12.MTR.7.1:	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems. • Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. **Clarifications:** Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. **Clarifications:** K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. **Clarifications:** See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. **Clarifications:** Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. **Clarifications:** In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think _______ because ______." The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. **Clarifications:** Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. **Clarifications:** In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

General Course Information and Notes

VERSION DESCRIPTION

In Precalculus Honors, instructional time will emphasize six areas: (1) extending right triangle trigonometry to unit circle trigonometry and trigonometric functions; (2) extending understanding of functions to trigonometric; (3) developing understanding of conic sections; (4) representing and performing operations with complex numbers and vectors in the coordinate plane; (5) extending understanding of relations in the plane using parametric representations, including polar coordinates and (6) analyzing arithmetic and geometric sequences and series.

All clarifications stated, whether general or specific to Precalculus Honors, are expectations for instruction of that benchmark.

Curricular content for all subjects must integrate critical-thinking, problem-solving, and workforce-literacy skills; communication, reading, and writing skills; mathematics skills; collaboration skills; contextual and applied-learning skills; technology-literacy skills; information and media-literacy skills; and civic-engagement skills.

GENERAL NOTES

Honors and Accelerated Level Course Note: Accelerated courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards
This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Number: 1202340

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Calculus >

Abbreviated Title: PRECALC H

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- Honors
- Class Size Core Required

Course Type: Core Academic Course

Course Level: 3

Course Status: State Board Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Mathematics

Educator Certifications

Mathematics (Grades 6-12)

Cambridge AICE Mathematics 1 AS Level (#1202352) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL INFORMATION

Course Number: 1202352

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Calculus >

Abbreviated Title: AICE MATH 1 AS

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- Advanced International Certificate of Education (AICE)

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Mathematics

Educator Certifications

Mathematics (Grades 6-12)

Cambridge AICE Mathematics & Mechanics 1 AS Level (#1202354) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

For more information about this Cambridge course, visit http://www.cie.org.uk/programmes-and-qualifications/cambridge-advanced/cambridge-international-as-and-a-levels/curriculum/.

GENERAL INFORMATION

Course Number: 1202354

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Calculus >

Abbreviated Title: AICE MATH&MECH 1 AS

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- Advanced International Certificate of Education (AICE)

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Mathematics

Educator Certifications

Mathematics (Grades 6-12)

Cambridge AICE Mathematics and Probability and Statistics 1 AS Level (#1202362) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

For more information about this Cambridge course, visit http://www.cie.org.uk/programmes-and-qualifications/cambridge-advanced/cambridge-international-as-and-a-levels/curriculum/.

GENERAL INFORMATION

Course Number: 1202362

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Probablility and Statistics >

Abbreviated Title: AICE MA PR ST 1 AS

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- Advanced International Certificate of Education (AICE)

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Mathematics

Educator Certifications

Mathematics (Grades 6-12)

Cambridge AICE Mathematics and Probability and Statistics 2 A Level (#1202364) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

For more information about this Cambridge course, visit http://www.cie.org.uk/programmes-and-qualifications/cambridge-advanced/cambridge-international-as-and-a-levels/curriculum/.

GENERAL INFORMATION

Course Number: 1202364

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Probablility and Statistics >

Abbreviated Title: AICE MA PR ST 2 AL

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- Advanced International Certificate of Education (AICE)

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Mathematics

Educator Certifications

Mathematics (Grades 6-12)

Cambridge AICE Further Mathematics 1 AS Level (#1202365) 2019 - And Beyond (current)

General Course Information and Notes

VERSION DESCRIPTION

For more information about this Cambridge course, visit http://www.cambridgeinternational.org/programmes-and-qualifications/cambridge-secondary-1/cambridge-secondary-1/curriculum/.

GENERAL INFORMATION

Course Number: 1202365

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Calculus >

Abbreviated Title: AICE FURTHERMATH 1AS

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- Advanced International Certificate of Education (AICE)

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Mathematics

Educator Certifications

Mathematics (Grades 6-12)

Cambridge AICE Mathematics and Mechanics and Probability and Statistics 2 A Level (#1202366) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

For more information about this Cambridge course, visit http://www.cie.org.uk/programmes-and-qualifications/cambridge-advanced/cambridge-international-as-and-a-levels/curriculum/.

GENERAL INFORMATION

Course Number: 1202366

Course Path: **Section:** Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Probablility and Statistics >

Abbreviated Title: AICE MA ME PR ST 2 AL

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- Advanced International Certificate of Education (AICE)

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Mathematics

Educator Certifications

Mathematics (Grades 6-12)

Cambridge AICE Further Mathematics 2 A Level (#1202370) 2019 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

For more information about this Cambridge course, visit http://www.cie.org.uk/programmes-and-qualifications/cambridge-advanced/cambridge-international-as-and-a-levels/curriculum/.

GENERAL INFORMATION

Course Number: 1202370

Course Path: **Section:** Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Calculus >

Abbreviated Title: AICE FURTHERMATH 2AL

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- Advanced International Certificate of Education (AICE)

Course Type: Core Academic Course

Course Level: 3

Course Status: Draft - Course Pending Approval

Grade Level(s): 9,10,11,12

Graduation Requirement: Mathematics

Educator Certifications

Mathematics (Grades 6-12)

Cambridge Pre-AICE Additional Mathematics 3 IGCSE Level (#1202371) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

For more information about this Cambridge course, visit http://www.cie.org.uk/programmes-and-qualifications/cambridge-secondary-2/cambridge-igcse/curriculum/.

GENERAL INFORMATION

Course Number: 1202371

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Calculus >

Abbreviated Title: PRE-AICE ADD MTH3 IG

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- Advanced International Certificate of Education (AICE)

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Mathematics

Educator Certifications

Mathematics (Grades 6-12)

International Baccalaureate Pre-Calculus (#1202375) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The curriculum description for this IB course is provided at http://www.ibo.org/en/programmes/.

GENERAL INFORMATION

Course Number: 1202375

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Calculus >

Abbreviated Title: IB PRE-CALCULUS

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- International Baccalaureate (IB)

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Mathematics

Educator Certifications

Mathematics (Grades 6-12)

International Baccalaureate MYP Pre-Calculus (#1202380) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The curriculum description for this IB course is provided at http://www.ibo.org/en/programmes/.

GENERAL INFORMATION

Course Number: 1202380

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Calculus >

Abbreviated Title: IB MYP PRE-CALCULUS

Course Length: Year (Y)

Course Attributes:

- International Baccalaureate (IB)

Course Level: 3

Course Status: Course Approved

Graduation Requirement: Mathematics

Educator Certifications

Mathematics (Grades 6-12)
Middle Grades Mathematics (Middle Grades 5-9)

Pre-Advanced Placement Geometry with Statistics (#1206305) 2020 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The course description for this Pre-Advanced Placement (Pre-AP) course is located on the College Board site at https://pre-ap.collegeboard.org/courses.

GENERAL INFORMATION

Course Number: 1206305

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Geometry >

Abbreviated Title: PRE-AP GEOM W/STAT

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- Advanced Placement (AP)

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 10

Graduation Requirement: Mathematics

Educator Certifications

Mathematics (Grades 6-12)

Geometry (#1206310) 2015 - 2022 (current)

Course Standards

Name	Description
MAFS.912.G-C.1.1:	Prove that all circles are similar.
MAFS.912.G-C.1.2:	Identify and describe relationships among inscribed angles, radii, and chords. *Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.*
MAFS.912.G-C.1.3:	Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.
MAFS.912.G-C.2.5:	Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.
MAFS.912.G-CO.1.1:	Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.
MAFS.912.G-CO.1.2:	Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).
MAFS.912.G-CO.1.3:	Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.
MAFS.912.G-CO.1.4:	Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.
MAFS.912.G-CO.1.5:	Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.
MAFS.912.G-CO.2.6:	Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.
MAFS.912.G-CO.2.7:	Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.
MAFS.912.G-CO.2.8:	Explain how the criteria for triangle congruence (ASA, SAS, SSS, and Hypotenuse-Leg) follow from the definition of congruence in terms of rigid motions.
MAFS.912.G-CO.3.9:	Prove theorems about lines and angles; use theorems about lines and angles to solve problems. *Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.*
MAFS.912.G-CO.3.10:	Prove theorems about triangles; use theorems about triangles to solve problems. *Theorems include: measures of interior angles of a triangle sum to 180°; triangle inequality theorem; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.*
MAFS.912.G-CO.3.11:	Prove theorems about parallelograms; use theorems about parallelograms to solve problems. *Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.*
MAFS.912.G-CO.4.12:	Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). *Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.* **Clarifications:** **Geometry - Fluency Recommendations** Fluency with the use of construction tools, physical and computational, helps students draft a model of a geometric phenomenon and can lead to conjectures and proofs.
MAFS.912.G-CO.4.13:	Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.
MAFS.912.G-GMD.1.1:	Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. *Use dissection arguments, Cavalieri's principle, and informal limit arguments.*
MAFS.912.G-GMD.1.3:	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. ★
MAFS.912.G-GMD.2.4:	Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.
MAFS.912.G-GPE.1.1:	Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.
MAFS.912.G-GPE.2.4:	Use coordinates to prove simple geometric theorems algebraically. *For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point (1, √3) lies on the circle centered at the origin and containing the point (0, 2).* **Clarifications:** **Geometry - Fluency Recommendations** Fluency with the use of coordinates to establish geometric results, calculate length and angle, and use geometric representations as a modeling tool are some of the most valuable tools in mathematics and related fields.
MAFS.912.G-GPE.2.5:	Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point). **Clarifications:** **Geometry - Fluency Recommendations** Fluency with the use of coordinates to establish geometric results, calculate length and angle, and use geometric representations as a modeling tool are some of the most valuable tools in mathematics and related fields.

MAFS.912.G-GPE.2.6:	Find the point on a directed line segment between two given points that partitions the segment in a given ratio.
MAFS.912.G-GPE.2.7:	Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula. ★ **Clarifications:** **Geometry - Fluency Recommendations** Fluency with the use of coordinates to establish geometric results, calculate length and angle, and use geometric representations as a modeling tool are some of the most valuable tools in mathematics and related fields.
MAFS.912.G-MG.1.1:	Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder). ★
MAFS.912.G-MG.1.2:	Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★
MAFS.912.G-MG.1.3:	Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios). ★
MAFS.912.G-SRT.1.1:	Verify experimentally the properties of dilations given by a center and a scale factor: a. A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged. b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor.
MAFS.912.G-SRT.1.2:	Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.
MAFS.912.G-SRT.1.3:	Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.
MAFS.912.G-SRT.2.4:	Prove theorems about triangles. *Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity.*
MAFS.912.G-SRT.2.5:	Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. **Clarifications:** **Geometry - Fluency Recommendations** Fluency with the triangle congruence and similarity criteria will help students throughout their investigations of triangles, quadrilaterals, circles, parallelism, and trigonometric ratios. These criteria are necessary tools in many geometric modeling tasks.
MAFS.912.G-SRT.3.6:	Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.
MAFS.912.G-SRT.3.7:	Explain and use the relationship between the sine and cosine of complementary angles.
MAFS.912.G-SRT.3.8:	Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. ★
MAFS.K12.MP.1.1:	**Make sense of problems and persevere in solving them.** Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
MAFS.K12.MP.2.1:	**Reason abstractly and quantitatively**. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
MAFS.K12.MP.3.1:	**Construct viable arguments and critique the reasoning of others.** Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
MAFS.K12.MP.4.1:	**Model with mathematics.** Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

MAFS.K12.MP.5.1:	**Use appropriate tools strategically.** Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
MAFS.K12.MP.6.1:	**Attend to precision.** Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
MAFS.K12.MP.7.1:	**Look for and make use of structure.** Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 – 3(x – y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
MAFS.K12.MP.8.1:	**Look for and express regularity in repeated reasoning.** Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y – 2)/(x – 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x – 1)(x + 1)$, $(x – 1)(x^2 + x + 1)$, and $(x – 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
LAFS.910.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
LAFS.910.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.
LAFS.910.RST.3.7:	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LAFS.910.SL.1.1:	Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed. c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions. d. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.
LAFS.910.SL.1.2:	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
LAFS.910.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.
LAFS.910.SL.2.4:	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
LAFS.910.WHST.1.1:	Write arguments focused on *discipline-specific content.* a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns. c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.910.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.910.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

VERSION DESCRIPTION

The fundamental purpose of the course in Geometry is to formalize and extend students' geometric experiences from the middle grades. Students explore more complex geometric situations and deepen their explanations of geometric relationships, moving towards formal mathematical arguments. Important differences exist between this Geometry course and the historical approach taken in Geometry classes. For example, transformations are emphasized early in this course. Close attention should be paid to the introductory content for the Geometry conceptual category found in the high school standards. The Standards for Mathematical Practice apply throughout each course and, together with the content standards, prescribe that students experience mathematics as a coherent, useful, and logical subject that makes use of their ability to make sense of problem situations. The critical areas, organized into five units are as follows.

Unit 1-Congruence, Proof, and Constructions: In previous grades, students were asked to draw triangles based on given measurements. They also have prior experience with rigid motions: translations, reflections, and rotations and have used these to develop notions about what it means for two objects to be congruent. In this unit, students establish triangle congruence criteria, based on analyses of rigid motions and formal constructions. They use triangle congruence as a familiar foundation for the development of formal proof. Students prove theorems using a variety of formats and solve problems about triangles, quadrilaterals, and other polygons. They apply reasoning to complete geometric constructions and explain why they work.

Unit 2- Similarity, Proof, and Trigonometry: Students apply their earlier experience with dilation and proportional reasoning to build a formal understanding of similarity. They identify criteria for similarity of triangles, use similarity to solve problems, and apply similarity in right triangles to understand right triangle trigonometry, with particular attention to special right triangles and the Pythagorean theorem. Students develop the Laws of Sines and Cosines in order to find missing measures of general (not necessarily right) triangles, building on students work with quadratic equations done in the first course. They are able to distinguish whether three given measures (angles or sides) define 0, 1, 2, or infinitely many triangles.

Unit 3- Extending to Three Dimensions: Students' experience with two-dimensional and three-dimensional objects is extended to include informal explanations of circumference, area and volume formulas. Additionally, students apply their knowledge of two-dimensional shapes to consider the shapes of cross-sections and the result of rotating a two-dimensional object about a line.

Unit 4- Connecting Algebra and Geometry Through Coordinates: Building on their work with the Pythagorean theorem in 8th grade to find distances, students use a rectangular coordinate system to verify geometric relationships, including properties of special triangles and quadrilaterals and slopes of parallel and perpendicular lines, which relates back to work done in the first course. Students continue their study of quadratics by connecting the geometric and algebraic definitions of the parabola.

Unit 5-Circles With and Without Coordinates: In this unit students prove basic theorems about circles, such as a tangent line is perpendicular to a radius, inscribed angle theorem, and theorems about chords, secants, and tangents dealing with segment lengths and angle measures. They study relationships among segments on chords, secants, and tangents as an application of similarity. In the Cartesian coordinate system, students use the distance formula to write the equation of a circle when given the radius and the coordinates of its center. Given an equation of a circle, they draw the graph in the coordinate plane, and apply techniques for solving quadratic equations, which relates back to work done in the first course, to determine intersections between lines and circles or parabolas and between two circles.

GENERAL NOTES

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:
https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

Additional Instructional Resources:
A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGI/cms/review.html?Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

Florida Standards Implementation Guide Focus Section:

The Mathematics Florida Standards Implementation Guide was created to support the teaching and learning of the Mathematics Florida Standards. The guide is compartmentalized into three components: focus, coherence, and rigor.Focus means narrowing the scope of content in each grade or course, so students achieve higher levels of understanding and experience math concepts more deeply. The Mathematics standards allow for the teaching and learning of mathematical concepts focused around major clusters at each grade level, enhanced by supporting and additional clusters. The major, supporting and additional clusters are identified, in relation to each grade or course. The cluster designations for this course are below.

Major Clusters

MAFS.912.G-CO.2 Understand congruence in terms of rigid motions.

MAFS.912.G-CO.3 Prove geometric theorems.

MAFS.912.G-SRT.1 Understand similarity in terms of similarity transformations.

MAFS.912.G-SRT.2 Prove theorems involving similarity.

MAFS.912.G-SRT.3 Define trigonometric ratios and solve problems involving right triangles.

MAFS.912.G-GPE.2 Use coordinates to prove simple geometric theorems algebraically.

MAFS.G-MG.1 Apply geometric concepts in modeling situations.

Supporting Clusters

MAFS.912.G-CO.1 Experiment with transformations in the plane.

MAFS.G-CO.4 Make geometric constructions.

Additional Clusters

MAFS.912.G-C.1 Understand and apply theorems about circles.

MAFS.912.G-C.2 Find arc lengths and areas of sectors of circles.

MAFS.912.G-GPE.1 Translate between the geometric description and the equation of a conic section.

MAFS.912.G-GMD.1 Explain volume formulas and use them to solve problems.

MAFS.912.G-GMD.2 Visualize relationships between two-dimensional and three-dimensional objects.

Note: Clusters should not be sorted from major to supporting and then taught in that order. To do so would strip the coherence of the mathematical ideas and miss the opportunity to enhance the major work of the grade with the supporting and additional clusters.

GENERAL INFORMATION

Course Number: 1206310

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Geometry >

Abbreviated Title: GEO

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- Class Size Core Required

Course Type: Core Academic Course

Course Level: 2

Course Status: Course Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Geometry

Educator Certifications

Mathematics (Grades 6-12)
Middle Grades Mathematics (Middle Grades 5-9)

Geometry (#1206310) 2022 - And Beyond

Course Standards

Name	Description
MA.912.GR.1.1:	Prove relationships and theorems about lines and angles. Solve mathematical and real-world problems involving postulates, relationships and theorems of lines and angles. **Clarifications:** *Clarification 1*: Postulates, relationships and theorems include vertical angles are congruent; when a transversal crosses parallel lines, the consecutive angles are supplementary and alternate (interior and exterior) angles and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints. *Clarification 2*: Instruction includes constructing two-column proofs, pictorial proofs, paragraph and narrative proofs, flow chart proofs or informal proofs. *Clarification 3*: Instruction focuses on helping a student choose a method they can use reliably.
MA.912.GR.1.2:	Prove triangle congruence or similarity using Side-Side-Side, Side-Angle-Side, Angle-Side-Angle, Angle-Angle-Side, Angle-Angle and Hypotenuse-Leg. **Clarifications:** *Clarification 1*: Instruction includes constructing two-column proofs, pictorial proofs, paragraph and narrative proofs, flow chart proofs or informal proofs. *Clarification 2*: Instruction focuses on helping a student choose a method they can use reliably.
MA.912.GR.1.3:	Prove relationships and theorems about triangles. Solve mathematical and real-world problems involving postulates, relationships and theorems of triangles. **Clarifications:** *Clarification 1*: Postulates, relationships and theorems include measures of interior angles of a triangle sum to 180°; measures of a set of exterior angles of a triangle sum to 360°; triangle inequality theorem; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point. *Clarification 2*: Instruction includes constructing two-column proofs, pictorial proofs, paragraph and narrative proofs, flow chart proofs or informal proofs. *Clarification 3*: Instruction focuses on helping a student choose a method they can use reliably.
MA.912.GR.1.4:	Prove relationships and theorems about parallelograms. Solve mathematical and real-world problems involving postulates, relationships and theorems of parallelograms. **Clarifications:** *Clarification 1*: Postulates, relationships and theorems include opposite sides are congruent, consecutive angles are supplementary, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and rectangles are parallelograms with congruent diagonals. *Clarification 2*: Instruction includes constructing two-column proofs, pictorial proofs, paragraph and narrative proofs, flow chart proofs or informal proofs. *Clarification 3*: Instruction focuses on helping a student choose a method they can use reliably.
MA.912.GR.1.5:	Prove relationships and theorems about trapezoids. Solve mathematical and real-world problems involving postulates, relationships and theorems of trapezoids. **Clarifications:** *Clarification 1*: Postulates, relationships and theorems include the Trapezoid Midsegment Theorem and for isosceles trapezoids: base angles are congruent, opposite angles are supplementary and diagonals are congruent. *Clarification 2*: Instruction includes constructing two-column proofs, pictorial proofs, paragraph and narrative proofs, flow chart proofs or informal proofs. *Clarification 3*: Instruction focuses on helping a student choose a method they can use reliably.
MA.912.GR.1.6:	Solve mathematical and real-world problems involving congruence or similarity in two-dimensional figures. **Clarifications:** *Clarification 1:* Instruction includes demonstrating that two-dimensional figures are congruent or similar based on given information.
MA.912.GR.2.1:	Given a preimage and image, describe the transformation and represent the transformation algebraically using coordinates. **Clarifications:** *Clarification 1*: Instruction includes the connection of transformations to functions that take points in the plane as inputs and give other points in the plane as outputs. *Clarification 2*: Transformations include translations, dilations, rotations and reflections described using words or using coordinates. *Clarification 3*: Within the Geometry course, rotations are limited to 90°, 180° and 270° counterclockwise or clockwise about the center of rotation, and the centers of rotations and dilations are limited to the origin or a point on the figure.
MA.912.GR.2.2:	Identify transformations that do or do not preserve distance. **Clarifications:** *Clarification 1*: Transformations include translations, dilations, rotations and reflections described using words or using coordinates. *Clarification 2*: Instruction includes recognizing that these transformations preserve angle measure.

MA.912.GR.2.3:	Identify a sequence of transformations that will map a given figure onto itself or onto another congruent or similar figure. **Clarifications:** *Clarification 1*: Transformations include translations, dilations, rotations and reflections described using words or using coordinates. *Clarification 2*: Within the Geometry course, figures are limited to triangles and quadrilaterals and rotations are limited to 90°, 180° and 270° counterclockwise or clockwise about the center of rotation. *Clarification 3*: Instruction includes the understanding that when a figure is mapped onto itself using a reflection, it occurs over a line of symmetry.
MA.912.GR.2.5:	Given a geometric figure and a sequence of transformations, draw the transformed figure on a coordinate plane. **Clarifications:** *Clarification 1*: Transformations include translations, dilations, rotations and reflections described using words or using coordinates. *Clarification 2*: Instruction includes two or more transformations.
MA.912.GR.2.6:	Apply rigid transformations to map one figure onto another to justify that the two figures are congruent. **Clarifications:** *Clarification 1*: Instruction includes showing that the corresponding sides and the corresponding angles are congruent.
MA.912.GR.2.8:	Apply an appropriate transformation to map one figure onto another to justify that the two figures are similar. **Clarifications:** *Clarification 1*: Instruction includes showing that the corresponding sides are proportional, and the corresponding angles are congruent.
MA.912.GR.3.1:	Determine the weighted average of two or more points on a line. **Clarifications:** *Clarification 1*: Instruction includes using a number line and determining how changing the weights moves the weighted average of points on the number line.
MA.912.GR.3.2:	Given a mathematical context, use coordinate geometry to classify or justify definitions, properties and theorems involving circles, triangles or quadrilaterals. **Clarifications:** *Clarification 1*: Instruction includes using the distance or midpoint formulas and knowledge of slope to classify or justify definitions, properties and theorems.
MA.912.GR.3.3:	Use coordinate geometry to solve mathematical and real-world geometric problems involving lines, circles, triangles and quadrilaterals. **Clarifications:** *Clarification 1*: Problems involving lines include the coordinates of a point on a line segment including the midpoint. *Clarification 2*: Problems involving circles include determining points on a given circle and finding tangent lines. *Clarification 3*: Problems involving triangles include median and centroid. *Clarification 4*: Problems involving quadrilaterals include using parallel and perpendicular slope criteria.
MA.912.GR.3.4:	Use coordinate geometry to solve mathematical and real-world problems on the coordinate plane involving perimeter or area of polygons.
MA.912.GR.4.1:	Identify the shapes of two-dimensional cross-sections of three-dimensional figures. **Clarifications:** *Clarification 1*: Instruction includes the use of manipulatives and models to visualize cross-sections. *Clarification 2*: Instruction focuses on cross-sections of right cylinders, right prisms, right pyramids and right cones that are parallel or perpendicular to the base.
MA.912.GR.4.2:	Identify three-dimensional objects generated by rotations of two-dimensional figures. **Clarifications:** *Clarification 1*: The axis of rotation must be within the same plane but outside of the given two-dimensional figure.
MA.912.GR.4.3:	Extend previous understanding of scale drawings and scale factors to determine how dilations affect the area of two-dimensional figures and the surface area or volume of three-dimensional figures.
MA.912.GR.4.4:	Solve mathematical and real-world problems involving the area of two-dimensional figures. **Clarifications:** *Clarification 1*: Instruction includes concepts of population density based on area.
MA.912.GR.4.5:	Solve mathematical and real-world problems involving the volume of three-dimensional figures limited to cylinders, pyramids, prisms, cones and spheres. **Clarifications:** *Clarification 1:* Instruction includes concepts of density based on volume. *Clarification 2:* Instruction includes using Cavalieri's Principle to give informal arguments about the formulas for the volumes of right and non-right cylinders, pyramids, prisms and cones.
MA.912.GR.4.6:	Solve mathematical and real-world problems involving the surface area of three-dimensional figures limited to cylinders, pyramids, prisms, cones and spheres.
MA.912.GR.5.1:	Construct a copy of a segment or an angle. **Clarifications:** *Clarification 1*: Instruction includes using compass and straightedge, string, reflective devices, paper folding or dynamic geometric software.
MA.912.GR.5.2:	Construct the bisector of a segment or an angle, including the perpendicular bisector of a line segment. **Clarifications:** *Clarification 1*: Instruction includes using compass and straightedge, string, reflective devices, paper folding or dynamic geometric software.
	Construct the inscribed and circumscribed circles of a triangle.

MA.912.GR.5.3:	**Clarifications:** *Clarification 1*: Instruction includes using compass and straightedge, string, reflective devices, paper folding or dynamic geometric software.
MA.912.GR.6.1:	Solve mathematical and real-world problems involving the length of a secant, tangent, segment or chord in a given circle. **Clarifications:** *Clarification 1:* Problems include relationships between two chords; two secants; a secant and a tangent; and the length of the tangent from a point to a circle.
MA.912.GR.6.2:	Solve mathematical and real-world problems involving the measures of arcs and related angles. **Clarifications:** *Clarification 1*: Within the Geometry course, problems are limited to relationships between inscribed angles; central angles; and angles formed by the following intersections: a tangent and a secant through the center, two tangents, and a chord and its perpendicular bisector.
MA.912.GR.6.3:	Solve mathematical problems involving triangles and quadrilaterals inscribed in a circle. **Clarifications:** *Clarification 1*: Instruction includes cases in which a triangle inscribed in a circle has a side that is the diameter.
MA.912.GR.6.4:	Solve mathematical and real-world problems involving the arc length and area of a sector in a given circle. **Clarifications:** *Clarification 1*: Instruction focuses on the conceptual understanding that for a given angle measure the length of the intercepted arc is proportional to the radius, and for a given radius the length of the intercepted arc is proportional is the angle measure.
MA.912.GR.7.2:	Given a mathematical or real-world context, derive and create the equation of a circle using key features. **Clarifications:** *Clarification 1:* Instruction includes using the Pythagorean Theorem and completing the square. *Clarification 2:* Within the Geometry course, key features are limited to the radius, diameter and the center.
MA.912.GR.7.3:	Graph and solve mathematical and real-world problems that are modeled with an equation of a circle. Determine and interpret key features in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain, range, eccentricity, center and radius. *Clarification 2*: Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation. *Clarification 3*: Within the Geometry course, notations for domain and range are limited to inequality and set-builder.
MA.912.LT.4.3:	Identify and accurately interpret “if…then,” “if and only if,” “all” and “not” statements. Find the converse, inverse and contrapositive of a statement. **Clarifications:** *Clarification 1:* Instruction focuses on recognizing the relationships between an “if…then” statement and the converse, inverse and contrapositive of that statement. *Clarification 2:* Within the Geometry course, instruction focuses on the connection to proofs within the course.
MA.912.LT.4.10:	Judge the validity of arguments and give counterexamples to disprove statements. **Clarifications:** *Clarification 1:* Within the Geometry course, instruction focuses on the connection to proofs within the course.
MA.912.T.1.1:	Define trigonometric ratios for acute angles in right triangles. **Clarifications:** *Clarification 1*: Instruction includes using the Pythagorean Theorem and using similar triangles to demonstrate that trigonometric ratios stay the same for similar right triangles. *Clarification 2*: Within the Geometry course, instruction includes using the coordinate plane to make connections to the unit circle. *Clarification 3*: Within the Geometry course, trigonometric ratios are limited to sine, cosine and tangent.
MA.912.T.1.2:	Solve mathematical and real-world problems involving right triangles using trigonometric ratios and the Pythagorean Theorem. **Clarifications:** *Clarification 1*: Instruction includes procedural fluency with the relationships of side lengths in special right triangles having angle measures of 30°-60°-90° and 45°-45°-90°.
MA.K12.MTR.1.1:	Mathematicians who participate in effortful learning both individually and with others: • Analyze the problem in a way that makes sense given the task. • Ask questions that will help with solving the task. • Build perseverance by modifying methods as needed while solving a challenging task. • Stay engaged and maintain a positive mindset when working to solve tasks. • Help and support each other when attempting a new method or approach. **Clarifications:** Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students’ ability to analyze and problem solve. • Recognize students’ effort when solving challenging problems.
	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: • Build understanding through modeling and using manipulatives. • Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. • Progress from modeling problems with objects and drawings to using algorithms and equations. • Express connections between concepts and representations.

MA.K12.MTR.2.1:

- Choose a representation based on the given context or purpose.

Clarifications:
Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:
- Help students make connections between concepts and representations.
- Provide opportunities for students to use manipulatives when investigating concepts.
- Guide students from concrete to pictorial to abstract representations as understanding progresses.
- Show students that various representations can have different purposes and can be useful in different situations.

MA.K12.MTR.3.1:

Complete tasks with mathematical fluency.
Mathematicians who complete tasks with mathematical fluency:

- Select efficient and appropriate methods for solving problems within the given context.
- Maintain flexibility and accuracy while performing procedures and mental calculations.
- Complete tasks accurately and with confidence.
- Adapt procedures to apply them to a new context.
- Use feedback to improve efficiency when performing calculations.

Clarifications:
Teachers who encourage students to complete tasks with mathematical fluency:
- Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.
- Offer multiple opportunities for students to practice efficient and generalizable methods.
- Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.

MA.K12.MTR.4.1:

Engage in discussions that reflect on the mathematical thinking of self and others.
Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:

- Communicate mathematical ideas, vocabulary and methods effectively.
- Analyze the mathematical thinking of others.
- Compare the efficiency of a method to those expressed by others.
- Recognize errors and suggest how to correctly solve the task.
- Justify results by explaining methods and processes.
- Construct possible arguments based on evidence.

Clarifications:
Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others:
- Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning.
- Create opportunities for students to discuss their thinking with peers.
- Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods.
- Develop students' ability to justify methods and compare their responses to the responses of their peers.

MA.K12.MTR.5.1:

Use patterns and structure to help understand and connect mathematical concepts.
Mathematicians who use patterns and structure to help understand and connect mathematical concepts:

- Focus on relevant details within a problem.
- Create plans and procedures to logically order events, steps or ideas to solve problems.
- Decompose a complex problem into manageable parts.
- Relate previously learned concepts to new concepts.
- Look for similarities among problems.
- Connect solutions of problems to more complicated large-scale situations.

Clarifications:
Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts:
- Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts.
- Support students to develop generalizations based on the similarities found among problems.
- Provide opportunities for students to create plans and procedures to solve problems.
- Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.

MA.K12.MTR.6.1:

Assess the reasonableness of solutions.
Mathematicians who assess the reasonableness of solutions:

- Estimate to discover possible solutions.
- Use benchmark quantities to determine if a solution makes sense.
- Check calculations when solving problems.
- Verify possible solutions by explaining the methods used.
- Evaluate results based on the given context.

Clarifications:
Teachers who encourage students to assess the reasonableness of solutions:
- Have students estimate or predict solutions prior to solving.
- Prompt students to continually ask, "Does this solution make sense? How do you know?"
- Reinforce that students check their work as they progress within and after a task.
- Strengthen students' ability to verify solutions through justifications.

Apply mathematics to real-world contexts.
Mathematicians who apply mathematics to real-world contexts:

- Connect mathematical concepts to everyday experiences.
- Use models and methods to understand, represent and solve problems.
- Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or

MA.K12.MTR.7.1:	efficiency. **Clarifications:** Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. **Clarifications:** K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. **Clarifications:** See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. **Clarifications:** Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. **Clarifications:** In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think _______ because ______." The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. **Clarifications:** Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. **Clarifications:** In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

General Course Information and Notes

VERSION DESCRIPTION

In Geometry, instructional time will emphasize five areas: (1) proving and applying relationships and theorems involving two-dimensional figures using Euclidean geometry and coordinate geometry; (2) establishing congruence and similarity using criteria from Euclidean geometry and using rigid transformations; (3) extending knowledge of geometric measurement to two-dimensional figures and three-dimensional figures; (4) creating and applying equations of circles in the coordinate plane and (5)developing an understanding of right triangle trigonometry.

All clarifications stated, whether general or specific to Geometry, are expectations for instruction of that benchmark.

Curricular content for all subjects must integrate critical-thinking, problem-solving, and workforce-literacy skills; communication, reading, and writing skills; mathematics skills; collaboration skills; contextual and applied-learning skills; technology-literacy skills; information and media-literacy skills; and civic-engagement skills.

GENERAL NOTES

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards
This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally

embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Number: 1206310

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Geometry >

Abbreviated Title: GEO

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- Class Size Core Required

Course Type: Core Academic Course

Course Level: 2

Course Status: State Board Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Geometry

Educator Certifications

Mathematics (Grades 6-12)
Middle Grades Mathematics (Middle Grades 5-9)

Geometry for Credit Recovery (#1206315) 2015 - 2022 (current)

Course Standards

Name	Description
MAFS.912.G-C.1.1:	Prove that all circles are similar.
MAFS.912.G-C.1.2:	Identify and describe relationships among inscribed angles, radii, and chords. *Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.*
MAFS.912.G-C.1.3:	Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.
MAFS.912.G-C.2.5:	Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.
MAFS.912.G-CO.1.1:	Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.
MAFS.912.G-CO.1.2:	Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).
MAFS.912.G-CO.1.3:	Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.
MAFS.912.G-CO.1.4:	Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.
MAFS.912.G-CO.1.5:	Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.
MAFS.912.G-CO.2.6:	Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.
MAFS.912.G-CO.2.7:	Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.
MAFS.912.G-CO.2.8:	Explain how the criteria for triangle congruence (ASA, SAS, SSS, and Hypotenuse-Leg) follow from the definition of congruence in terms of rigid motions.
MAFS.912.G-CO.3.9:	Prove theorems about lines and angles; use theorems about lines and angles to solve problems. *Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.*
MAFS.912.G-CO.3.10:	Prove theorems about triangles; use theorems about triangles to solve problems. *Theorems include: measures of interior angles of a triangle sum to 180°; triangle inequality theorem; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.*
MAFS.912.G-CO.3.11:	Prove theorems about parallelograms; use theorems about parallelograms to solve problems. *Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.*
MAFS.912.G-CO.4.12:	Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). *Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.* **Clarifications:** **Geometry - Fluency Recommendations** Fluency with the use of construction tools, physical and computational, helps students draft a model of a geometric phenomenon and can lead to conjectures and proofs.
MAFS.912.G-CO.4.13:	Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.
MAFS.912.G-GMD.1.1:	Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. *Use dissection arguments, Cavalieri's principle, and informal limit arguments.*
MAFS.912.G-GMD.1.3:	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. ★
MAFS.912.G-GMD.2.4:	Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.
MAFS.912.G-GPE.1.1:	Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.
MAFS.912.G-GPE.2.4:	Use coordinates to prove simple geometric theorems algebraically. *For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point (1, √3) lies on the circle centered at the origin and containing the point (0, 2).* **Clarifications:** **Geometry - Fluency Recommendations** Fluency with the use of coordinates to establish geometric results, calculate length and angle, and use geometric representations as a modeling tool are some of the most valuable tools in mathematics and related fields.
MAFS.912.G-GPE.2.5:	Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point). **Clarifications:** **Geometry - Fluency Recommendations** Fluency with the use of coordinates to establish geometric results, calculate length and angle, and use geometric representations as a modeling tool are some of the most valuable tools in mathematics and related fields.

MAFS.912.G-GPE.2.6:	Find the point on a directed line segment between two given points that partitions the segment in a given ratio.
MAFS.912.G-GPE.2.7:	Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula. ★ **Clarifications:** **Geometry - Fluency Recommendations** Fluency with the use of coordinates to establish geometric results, calculate length and angle, and use geometric representations as a modeling tool are some of the most valuable tools in mathematics and related fields.
MAFS.912.G-MG.1.1:	Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder). ★
MAFS.912.G-MG.1.2:	Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★
MAFS.912.G-MG.1.3:	Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios). ★
MAFS.912.G-SRT.1.1:	Verify experimentally the properties of dilations given by a center and a scale factor: a. A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged. b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor.
MAFS.912.G-SRT.1.2:	Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.
MAFS.912.G-SRT.1.3:	Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.
MAFS.912.G-SRT.2.4:	Prove theorems about triangles. *Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity.*
MAFS.912.G-SRT.2.5:	Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. **Clarifications:** **Geometry - Fluency Recommendations** Fluency with the triangle congruence and similarity criteria will help students throughout their investigations of triangles, quadrilaterals, circles, parallelism, and trigonometric ratios. These criteria are necessary tools in many geometric modeling tasks.
MAFS.912.G-SRT.3.6:	Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.
MAFS.912.G-SRT.3.7:	Explain and use the relationship between the sine and cosine of complementary angles.
MAFS.912.G-SRT.3.8:	Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. ★
MAFS.K12.MP.1.1:	**Make sense of problems and persevere in solving them.** Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
MAFS.K12.MP.2.1:	**Reason abstractly and quantitatively**. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
MAFS.K12.MP.3.1:	**Construct viable arguments and critique the reasoning of others.** Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
MAFS.K12.MP.4.1:	**Model with mathematics.** Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

MAFS.K12.MP.5.1:	**Use appropriate tools strategically.** Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
MAFS.K12.MP.6.1:	**Attend to precision.** Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
MAFS.K12.MP.7.1:	**Look for and make use of structure.** Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
MAFS.K12.MP.8.1:	**Look for and express regularity in repeated reasoning.** Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
LAFS.910.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
LAFS.910.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.
LAFS.910.RST.3.7:	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LAFS.910.SL.1.1:	Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed. c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions. d. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.
LAFS.910.SL.1.2:	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
LAFS.910.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.
LAFS.910.SL.2.4:	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
LAFS.910.WHST.1.1:	Write arguments focused on *discipline-specific content.* a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns. c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.910.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.910.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

VERSION DESCRIPTION

Special notes: Credit Recovery courses are credit bearing courses with specific content requirements defined by Next Generation Sunshine State Standards and/or Florida Standards. Students enrolled in a Credit Recovery course must have previously attempted the corresponding course (and/or End-of-Course assessment) since the course requirements for the Credit Recovery course are exactly the same as the previously attempted corresponding course. For example, Geometry (1206310) and Geometry for Credit Recovery (1206315) have identical content requirements. It is important to note that Credit Recovery courses are not bound by Section 1003.436(1)(a), Florida Statutes, requiring a minimum of 135 hours of bona fide instruction (120 hours in a school/district implementing block scheduling) in a designed course of study that contains student performance standards, since the students have previously attempted successful completion of the corresponding course. Additionally, Credit Recovery courses should ONLY be used for credit recovery, grade forgiveness, or remediation for students needing to prepare for an End-of-Course assessment retake.

GENERAL NOTES

The fundamental purpose of the course in Geometry is to formalize and extend students' geometric experiences from the middle grades. Students explore more complex geometric situations and deepen their explanations of geometric relationships, moving towards formal mathematical arguments. Important differences exist between this Geometry course and the historical approach taken in Geometry classes. For example, transformations are emphasized early in this course. Close attention should be paid to the introductory content for the Geometry conceptual category found in the high school CCSS. The Standards for Mathematical Practice apply throughout each course and, together with the content standards, prescribe that students experience mathematics as a coherent, useful, and logical subject that makes use of their ability to make sense of problem situations. The critical areas, organized into five units are as follows.

Unit 1- Congruence, Proof, and Constructions: In previous grades, students were asked to draw triangles based on given measurements. They also have prior experience with rigid motions: translations, reflections, and rotations and have used these to develop notions about what it means for two objects to be congruent. In this unit, students establish triangle congruence criteria, based on analyses of rigid motions and formal constructions. They use triangle congruence as a familiar foundation for the development of formal proof. Students prove theorems—using a variety of formats—and solve problems about triangles, quadrilaterals, and other polygons. They apply reasoning to complete geometric constructions and explain why they work.

Unit 2- Similarity, Proof, and Trigonometry: Students apply their earlier experience with dilations and proportional reasoning to build a formal understanding of similarity. They identify criteria for similarity of triangles, use similarity to solve problems, and apply similarity in right triangles to understand right triangle trigonometry, with particular attention to special right triangles and the Pythagorean theorem. Students develop the Laws of Sines and Cosines in order to find missing measures of general (not necessarily right) triangles, building on students' work with quadratic equations done in the first course. They are able to distinguish whether three given measures (angles or sides) define 0, 1, 2, or infinitely many triangles.

Unit 3- Extending to Three Dimensions: Students' experience with two-dimensional and three-dimensional objects is extended to include informal explanations of circumference, area and volume formulas. Additionally, students apply their knowledge of two-dimensional shapes to consider the shapes of cross-sections and the result of rotating a two-dimensional object about a line.

Unit 4- Connecting Algebra and Geometry Through Coordinates: Building on their work with the Pythagorean theorem in 8th grade to find distances, students use a rectangular coordinate system to verify geometric relationships, including properties of special triangles and quadrilaterals and slopes of parallel and perpendicular lines, which relates back to work done in the first course. Students continue their study of quadratics by connecting the geometric and algebraic definitions of the parabola.

Unit 5- Circles With and Without Coordinates: In this unit students prove basic theorems about circles, such as a tangent line is perpendicular to a radius, inscribed angle theorem, and theorems about chords, secants, and tangents dealing with segment lengths and angle measures. They study relationships among segments on chords, secants, and tangents as an application of similarity. In the Cartesian coordinate system, students use the distance formula to write the equation of a circle when given the radius and the coordinates of its center. Given an equation of a circle, they draw the graph in the coordinate plane, and apply techniques for solving quadratic equations, which relates back to work done in the first course, to determine intersections between lines and circles or parabolas and between two circles.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:
https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Number: 1206315

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Geometry >

Abbreviated Title: GEO CR

Number of Credits: One (1) credit

Course Length: Credit Recovery (R)

Course Type: Elective Course

Course Level: 2

Course Status: Course Approved

Grade Level(s): 9,10,11,12

Educator Certifications

Mathematics (Grades 6-12)
Middle Grades Mathematics (Middle Grades 5-9)

Geometry for Credit Recovery (#1206315) 2022 - And Beyond

Course Standards

Name	Description
MA.912.GR.1.1:	Prove relationships and theorems about lines and angles. Solve mathematical and real-world problems involving postulates, relationships and theorems of lines and angles. **Clarifications:** *Clarification 1*: Postulates, relationships and theorems include vertical angles are congruent; when a transversal crosses parallel lines, the consecutive angles are supplementary and alternate (interior and exterior) angles and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints. *Clarification 2*: Instruction includes constructing two-column proofs, pictorial proofs, paragraph and narrative proofs, flow chart proofs or informal proofs. *Clarification 3*: Instruction focuses on helping a student choose a method they can use reliably.
MA.912.GR.1.2:	Prove triangle congruence or similarity using Side-Side-Side, Side-Angle-Side, Angle-Side-Angle, Angle-Angle-Side, Angle-Angle and Hypotenuse-Leg. **Clarifications:** *Clarification 1*: Instruction includes constructing two-column proofs, pictorial proofs, paragraph and narrative proofs, flow chart proofs or informal proofs. *Clarification 2*: Instruction focuses on helping a student choose a method they can use reliably.
MA.912.GR.1.3:	Prove relationships and theorems about triangles. Solve mathematical and real-world problems involving postulates, relationships and theorems of triangles. **Clarifications:** *Clarification 1*: Postulates, relationships and theorems include measures of interior angles of a triangle sum to 180°; measures of a set of exterior angles of a triangle sum to 360°; triangle inequality theorem; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point. *Clarification 2*: Instruction includes constructing two-column proofs, pictorial proofs, paragraph and narrative proofs, flow chart proofs or informal proofs. *Clarification 3*: Instruction focuses on helping a student choose a method they can use reliably.
MA.912.GR.1.4:	Prove relationships and theorems about parallelograms. Solve mathematical and real-world problems involving postulates, relationships and theorems of parallelograms. **Clarifications:** *Clarification 1*: Postulates, relationships and theorems include opposite sides are congruent, consecutive angles are supplementary, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and rectangles are parallelograms with congruent diagonals. *Clarification 2*: Instruction includes constructing two-column proofs, pictorial proofs, paragraph and narrative proofs, flow chart proofs or informal proofs. *Clarification 3*: Instruction focuses on helping a student choose a method they can use reliably.
MA.912.GR.1.5:	Prove relationships and theorems about trapezoids. Solve mathematical and real-world problems involving postulates, relationships and theorems of trapezoids. **Clarifications:** *Clarification 1*: Postulates, relationships and theorems include the Trapezoid Midsegment Theorem and for isosceles trapezoids: base angles are congruent, opposite angles are supplementary and diagonals are congruent. *Clarification 2*: Instruction includes constructing two-column proofs, pictorial proofs, paragraph and narrative proofs, flow chart proofs or informal proofs. *Clarification 3*: Instruction focuses on helping a student choose a method they can use reliably.
MA.912.GR.1.6:	Solve mathematical and real-world problems involving congruence or similarity in two-dimensional figures. **Clarifications:** *Clarification 1:* Instruction includes demonstrating that two-dimensional figures are congruent or similar based on given information.
MA.912.GR.2.1:	Given a preimage and image, describe the transformation and represent the transformation algebraically using coordinates. **Clarifications:** *Clarification 1*: Instruction includes the connection of transformations to functions that take points in the plane as inputs and give other points in the plane as outputs. *Clarification 2*: Transformations include translations, dilations, rotations and reflections described using words or using coordinates. *Clarification 3*: Within the Geometry course, rotations are limited to 90°, 180° and 270° counterclockwise or clockwise about the center of rotation, and the centers of rotations and dilations are limited to the origin or a point on the figure.
MA.912.GR.2.2:	Identify transformations that do or do not preserve distance. **Clarifications:** *Clarification 1*: Transformations include translations, dilations, rotations and reflections described using words or using coordinates. *Clarification 2*: Instruction includes recognizing that these transformations preserve angle measure.

MA.912.GR.2.3:	Identify a sequence of transformations that will map a given figure onto itself or onto another congruent or similar figure. **Clarifications:** *Clarification 1*: Transformations include translations, dilations, rotations and reflections described using words or using coordinates. *Clarification 2*: Within the Geometry course, figures are limited to triangles and quadrilaterals and rotations are limited to 90°, 180° and 270° counterclockwise or clockwise about the center of rotation. *Clarification 3*: Instruction includes the understanding that when a figure is mapped onto itself using a reflection, it occurs over a line of symmetry.
MA.912.GR.2.5:	Given a geometric figure and a sequence of transformations, draw the transformed figure on a coordinate plane. **Clarifications:** *Clarification 1*: Transformations include translations, dilations, rotations and reflections described using words or using coordinates. *Clarification 2*: Instruction includes two or more transformations.
MA.912.GR.2.6:	Apply rigid transformations to map one figure onto another to justify that the two figures are congruent. **Clarifications:** *Clarification 1*: Instruction includes showing that the corresponding sides and the corresponding angles are congruent.
MA.912.GR.2.8:	Apply an appropriate transformation to map one figure onto another to justify that the two figures are similar. **Clarifications:** *Clarification 1*: Instruction includes showing that the corresponding sides are proportional, and the corresponding angles are congruent.
MA.912.GR.3.1:	Determine the weighted average of two or more points on a line. **Clarifications:** *Clarification 1*: Instruction includes using a number line and determining how changing the weights moves the weighted average of points on the number line.
MA.912.GR.3.2:	Given a mathematical context, use coordinate geometry to classify or justify definitions, properties and theorems involving circles, triangles or quadrilaterals. **Clarifications:** *Clarification 1*: Instruction includes using the distance or midpoint formulas and knowledge of slope to classify or justify definitions, properties and theorems.
MA.912.GR.3.3:	Use coordinate geometry to solve mathematical and real-world geometric problems involving lines, circles, triangles and quadrilaterals. **Clarifications:** *Clarification 1*: Problems involving lines include the coordinates of a point on a line segment including the midpoint. *Clarification 2*: Problems involving circles include determining points on a given circle and finding tangent lines. *Clarification 3*: Problems involving triangles include median and centroid. *Clarification 4*: Problems involving quadrilaterals include using parallel and perpendicular slope criteria.
MA.912.GR.3.4:	Use coordinate geometry to solve mathematical and real-world problems on the coordinate plane involving perimeter or area of polygons.
MA.912.GR.4.1:	Identify the shapes of two-dimensional cross-sections of three-dimensional figures. **Clarifications:** *Clarification 1*: Instruction includes the use of manipulatives and models to visualize cross-sections. *Clarification 2*: Instruction focuses on cross-sections of right cylinders, right prisms, right pyramids and right cones that are parallel or perpendicular to the base.
MA.912.GR.4.2:	Identify three-dimensional objects generated by rotations of two-dimensional figures. **Clarifications:** *Clarification 1*: The axis of rotation must be within the same plane but outside of the given two-dimensional figure.
MA.912.GR.4.3:	Extend previous understanding of scale drawings and scale factors to determine how dilations affect the area of two-dimensional figures and the surface area or volume of three-dimensional figures.
MA.912.GR.4.4:	Solve mathematical and real-world problems involving the area of two-dimensional figures. **Clarifications:** *Clarification 1*: Instruction includes concepts of population density based on area.
MA.912.GR.4.5:	Solve mathematical and real-world problems involving the volume of three-dimensional figures limited to cylinders, pyramids, prisms, cones and spheres. **Clarifications:** *Clarification 1:* Instruction includes concepts of density based on volume. *Clarification 2:* Instruction includes using Cavalieri's Principle to give informal arguments about the formulas for the volumes of right and non-right cylinders, pyramids, prisms and cones.
MA.912.GR.4.6:	Solve mathematical and real-world problems involving the surface area of three-dimensional figures limited to cylinders, pyramids, prisms, cones and spheres.
MA.912.GR.5.1:	Construct a copy of a segment or an angle. **Clarifications:** *Clarification 1*: Instruction includes using compass and straightedge, string, reflective devices, paper folding or dynamic geometric software.
MA.912.GR.5.2:	Construct the bisector of a segment or an angle, including the perpendicular bisector of a line segment. **Clarifications:** *Clarification 1*: Instruction includes using compass and straightedge, string, reflective devices, paper folding or dynamic geometric software.
	Construct the inscribed and circumscribed circles of a triangle.

MA.912.GR.5.3:	**Clarifications:** *Clarification 1*: Instruction includes using compass and straightedge, string, reflective devices, paper folding or dynamic geometric software.
MA.912.GR.6.1:	Solve mathematical and real-world problems involving the length of a secant, tangent, segment or chord in a given circle. **Clarifications:** *Clarification 1:* Problems include relationships between two chords; two secants; a secant and a tangent; and the length of the tangent from a point to a circle.
MA.912.GR.6.2:	Solve mathematical and real-world problems involving the measures of arcs and related angles. **Clarifications:** *Clarification 1*: Within the Geometry course, problems are limited to relationships between inscribed angles; central angles; and angles formed by the following intersections: a tangent and a secant through the center, two tangents, and a chord and its perpendicular bisector.
MA.912.GR.6.3:	Solve mathematical problems involving triangles and quadrilaterals inscribed in a circle. **Clarifications:** *Clarification 1*: Instruction includes cases in which a triangle inscribed in a circle has a side that is the diameter.
MA.912.GR.6.4:	Solve mathematical and real-world problems involving the arc length and area of a sector in a given circle. **Clarifications:** *Clarification 1*: Instruction focuses on the conceptual understanding that for a given angle measure the length of the intercepted arc is proportional to the radius, and for a given radius the length of the intercepted arc is proportional is the angle measure.
MA.912.GR.7.2:	Given a mathematical or real-world context, derive and create the equation of a circle using key features. **Clarifications:** *Clarification 1:* Instruction includes using the Pythagorean Theorem and completing the square. *Clarification 2:* Within the Geometry course, key features are limited to the radius, diameter and the center.
MA.912.GR.7.3:	Graph and solve mathematical and real-world problems that are modeled with an equation of a circle. Determine and interpret key features in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain, range, eccentricity, center and radius. *Clarification 2*: Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation. *Clarification 3*: Within the Geometry course, notations for domain and range are limited to inequality and set-builder.
MA.912.LT.4.3:	Identify and accurately interpret “if…then,” “if and only if,” “all” and “not” statements. Find the converse, inverse and contrapositive of a statement. **Clarifications:** *Clarification 1:* Instruction focuses on recognizing the relationships between an “if…then” statement and the converse, inverse and contrapositive of that statement. *Clarification 2:* Within the Geometry course, instruction focuses on the connection to proofs within the course.
MA.912.LT.4.10:	Judge the validity of arguments and give counterexamples to disprove statements. **Clarifications:** *Clarification 1:* Within the Geometry course, instruction focuses on the connection to proofs within the course.
MA.912.T.1.1:	Define trigonometric ratios for acute angles in right triangles. **Clarifications:** *Clarification 1*: Instruction includes using the Pythagorean Theorem and using similar triangles to demonstrate that trigonometric ratios stay the same for similar right triangles. *Clarification 2*: Within the Geometry course, instruction includes using the coordinate plane to make connections to the unit circle. *Clarification 3*: Within the Geometry course, trigonometric ratios are limited to sine, cosine and tangent.
MA.912.T.1.2:	Solve mathematical and real-world problems involving right triangles using trigonometric ratios and the Pythagorean Theorem. **Clarifications:** *Clarification 1*: Instruction includes procedural fluency with the relationships of side lengths in special right triangles having angle measures of 30°-60°-90° and 45°-45°-90°.
MA.K12.MTR.1.1:	Mathematicians who participate in effortful learning both individually and with others: • Analyze the problem in a way that makes sense given the task. • Ask questions that will help with solving the task. • Build perseverance by modifying methods as needed while solving a challenging task. • Stay engaged and maintain a positive mindset when working to solve tasks. • Help and support each other when attempting a new method or approach. **Clarifications:** Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students’ ability to analyze and problem solve. • Recognize students’ effort when solving challenging problems.
	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: • Build understanding through modeling and using manipulatives. • Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. • Progress from modeling problems with objects and drawings to using algorithms and equations. • Express connections between concepts and representations.

MA.K12.MTR.2.1:	• Choose a representation based on the given context or purpose. **Clarifications:** Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations. **Clarifications:** Teachers who encourage students to complete tasks with mathematical fluency: • Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. • Offer multiple opportunities for students to practice efficient and generalizable methods. • Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: • Communicate mathematical ideas, vocabulary and methods effectively. • Analyze the mathematical thinking of others. • Compare the efficiency of a method to those expressed by others. • Recognize errors and suggest how to correctly solve the task. • Justify results by explaining methods and processes. • Construct possible arguments based on evidence. **Clarifications:** Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. **Clarifications:** Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. **Clarifications:** Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems. • Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or

MA.K12.MTR.7.1:	efficiency. **Clarifications:** Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. **Clarifications:** K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. **Clarifications:** See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. **Clarifications:** Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. **Clarifications:** In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think _______ because ______." The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. **Clarifications:** Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. **Clarifications:** In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

General Course Information and Notes

VERSION DESCRIPTION

In Geometry for Credit Recovery, instructional time will emphasize six areas: (1) proving and applying relationships and theorems involving two-dimensional figures using Euclidean geometry and coordinate geometry; (2) establishing congruence and similarity using criteria from Euclidean geometry and using rigid transformations; (3) extending knowledge of geometric measurement to two-dimensional figures and three-dimensional figures; (4) creating and applying equations of circles in the coordinate plane and (5) developing an understanding of right triangle trigonometry.

All clarifications stated, whether general or specific to Geometry, are expectations for instruction of that benchmark.

Curricular content for all subjects must integrate critical-thinking, problem-solving, and workforce-literacy skills; communication, reading, and writing skills; mathematics skills; collaboration skills; contextual and applied-learning skills; technology-literacy skills; information and media-literacy skills; and civic-engagement skills.

Credit Recovery courses are credit bearing courses with specific content requirements defined by Next Generation Sunshine State Standards and/or Florida Standards. Students enrolled in a Credit Recovery course must have previously attempted the corresponding course (and/or End-of-Course assessment) since the course requirements for the Credit Recovery course are exactly the same as the previously attempted corresponding course. For example, Geometry (1206310) and Geometry for Credit Recovery (1206315) have identical content requirements. It is important to note that Credit Recovery courses are not bound by Section 1003.436(1)(a), Florida Statutes, requiring a minimum of 135 hours of bona fide instruction (120 hours in a school/district implementing block scheduling) in a designed course of study that contains student performance standards, since the students have previously attempted successful completion of the corresponding course. Additionally, Credit Recovery courses should ONLY be used for credit recovery, grade forgiveness, or remediation for students needing to prepare for an End-of-Course assessment retake.

GENERAL NOTES

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards
This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Number: 1206315

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Geometry >

Abbreviated Title: GEO CR

Number of Credits: One (1) credit

Course Length: Credit Recovery (R)

Course Attributes:

- Class Size Core Required

Course Type: Elective Course

Course Level: 2

Course Status: State Board Approved

Grade Level(s): 9,10,11,12

Educator Certifications

Mathematics (Grades 6-12)
Middle Grades Mathematics (Middle Grades 5-9)

Geometry Honors (#1206320) 2015 - 2022 (current)

Course Standards

Name	Description
MAFS.912.G-C.1.1:	Prove that all circles are similar.
MAFS.912.G-C.1.2:	Identify and describe relationships among inscribed angles, radii, and chords. *Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.*
MAFS.912.G-C.1.3:	Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.
MAFS.912.G-C.1.4:	Construct a tangent line from a point outside a given circle to the circle.
MAFS.912.G-C.2.5:	Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.
MAFS.912.G-CO.1.1:	Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.
MAFS.912.G-CO.1.2:	Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).
MAFS.912.G-CO.1.3:	Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.
MAFS.912.G-CO.1.4:	Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.
MAFS.912.G-CO.1.5:	Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.
MAFS.912.G-CO.2.6:	Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.
MAFS.912.G-CO.2.7:	Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.
MAFS.912.G-CO.2.8:	Explain how the criteria for triangle congruence (ASA, SAS, SSS, and Hypotenuse-Leg) follow from the definition of congruence in terms of rigid motions.
MAFS.912.G-CO.3.9:	Prove theorems about lines and angles; use theorems about lines and angles to solve problems. *Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.*
MAFS.912.G-CO.3.10:	Prove theorems about triangles; use theorems about triangles to solve problems. *Theorems include: measures of interior angles of a triangle sum to 180°; triangle inequality theorem; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.*
MAFS.912.G-CO.3.11:	Prove theorems about parallelograms; use theorems about parallelograms to solve problems. *Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.*
MAFS.912.G-CO.4.12:	Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). *Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.* **Clarifications:** **Geometry - Fluency Recommendations** Fluency with the use of construction tools, physical and computational, helps students draft a model of a geometric phenomenon and can lead to conjectures and proofs.
MAFS.912.G-CO.4.13:	Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.
MAFS.912.G-GMD.1.1:	Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. *Use dissection arguments, Cavalieri's principle, and informal limit arguments.*
MAFS.912.G-GMD.1.2:	Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures.
MAFS.912.G-GMD.1.3:	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. ★
MAFS.912.G-GMD.2.4:	Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.
MAFS.912.G-GPE.1.1:	Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.
MAFS.912.G-GPE.1.2:	Derive the equation of a parabola given a focus and directrix.
MAFS.912.G-GPE.1.3:	Derive the equations of ellipses and hyperbolas given the foci and directrices.
MAFS.912.G-GPE.2.4:	Use coordinates to prove simple geometric theorems algebraically. *For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point (1, √3) lies on the circle centered at the origin and containing the point (0, 2).* **Clarifications:** **Geometry - Fluency Recommendations** Fluency with the use of coordinates to establish geometric results, calculate length and angle, and use geometric representations as a modeling tool are some of the most valuable tools in mathematics and related fields.
	Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).

MAFS.912.G-GPE.2.5:	**Clarifications:** **Geometry - Fluency Recommendations** Fluency with the use of coordinates to establish geometric results, calculate length and angle, and use geometric representations as a modeling tool are some of the most valuable tools in mathematics and related fields.
MAFS.912.G-GPE.2.6:	Find the point on a directed line segment between two given points that partitions the segment in a given ratio.
MAFS.912.G-GPE.2.7:	Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula. ★ **Clarifications:** **Geometry - Fluency Recommendations** Fluency with the use of coordinates to establish geometric results, calculate length and angle, and use geometric representations as a modeling tool are some of the most valuable tools in mathematics and related fields.
MAFS.912.G-MG.1.1:	Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder). ★
MAFS.912.G-MG.1.2:	Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). ★
MAFS.912.G-MG.1.3:	Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios). ★
MAFS.912.G-SRT.1.1:	Verify experimentally the properties of dilations given by a center and a scale factor: a. A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged. b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor.
MAFS.912.G-SRT.1.2:	Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.
MAFS.912.G-SRT.1.3:	Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.
MAFS.912.G-SRT.2.4:	Prove theorems about triangles. *Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity.*
MAFS.912.G-SRT.2.5:	Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. **Clarifications:** **Geometry - Fluency Recommendations** Fluency with the triangle congruence and similarity criteria will help students throughout their investigations of triangles, quadrilaterals, circles, parallelism, and trigonometric ratios. These criteria are necessary tools in many geometric modeling tasks.
MAFS.912.G-SRT.3.6:	Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.
MAFS.912.G-SRT.3.7:	Explain and use the relationship between the sine and cosine of complementary angles.
MAFS.912.G-SRT.3.8:	Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. ★
MAFS.912.G-SRT.4.10:	Prove the Laws of Sines and Cosines and use them to solve problems.
MAFS.912.G-SRT.4.11:	Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).
MAFS.K12.MP.1.1:	**Make sense of problems and persevere in solving them.** Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
MAFS.K12.MP.2.1:	**Reason abstractly and quantitatively**. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
MAFS.K12.MP.3.1:	**Construct viable arguments and critique the reasoning of others.** Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
	Model with mathematics.

MAFS.K12.MP.4.1:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
MAFS.K12.MP.5.1:	**Use appropriate tools strategically.** Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
MAFS.K12.MP.6.1:	**Attend to precision.** Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
MAFS.K12.MP.7.1:	**Look for and make use of structure.** Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
MAFS.K12.MP.8.1:	**Look for and express regularity in repeated reasoning.** Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
LAFS.910.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
LAFS.910.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.
LAFS.910.RST.3.7:	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
LAFS.910.SL.1.1:	Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed. c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions. d. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.
LAFS.910.SL.1.2:	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
LAFS.910.SL.1.3:	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.
LAFS.910.SL.2.4:	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
LAFS.910.WHST.1.1:	Write arguments focused on *discipline-specific content.* a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns. c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and

	reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.910.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.910.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

VERSION DESCRIPTION

The fundamental purpose of the course in Geometry is to formalize and extend students' geometric experiences from the middle grades. Students explore more complex geometric situations and deepen their explanations of geometric relationships, moving towards formal mathematical arguments. Important differences exist between this Geometry course and the historical approach taken in Geometry classes. For example, transformations are emphasized early in this course. Close attention should be paid to the introductory content for the Geometry conceptual category found in the high school standards. The Standards for Mathematical Practice apply throughout each course and, together with the content standards, prescribe that students experience mathematics as a coherent, useful, and logical subject that makes use of their ability to make sense of problem situations. The critical areas, organized into five units are as follows.

Unit 1- Congruence, Proof, and Constructions: In previous grades, students were asked to draw triangles based on given measurements. They also have prior experience with rigid motions: translations, reflections, and rotations and have used these to develop notions about what it means for two objects to be congruent. In this unit, students establish triangle congruence criteria, based on analyses of rigid motions and formal constructions. They use triangle congruence as a familiar foundation for the development of formal proof. Students prove theorems using a variety of formats and solve problems about triangles, quadrilaterals, and other polygons. They apply reasoning to complete geometric constructions and explain why they work.

Unit 2- Similarity, Proof, and Trigonometry: Students apply their earlier experience with dilation and proportional reasoning to build a formal understanding of similarity. They identify criteria for similarity of triangles, use similarity to solve problems, and apply similarity in right triangles to understand right triangle trigonometry, with particular attention to special right triangles and the Pythagorean theorem. Students develop the Laws of Sines and Cosines in order to find missing measures of general (not necessarily right) triangles, building on students work with quadratic equations done in the first course. They are able to distinguish whether three given measures (angles or sides) define 0, 1, 2, or infinitely many triangles.

Unit 3- Extending to Three Dimensions: Students' experience with two-dimensional and three-dimensional objects is extended to include informal explanations of circumference, area and volume formulas. Additionally, students apply their knowledge of two-dimensional shapes to consider the shapes of cross-sections and the result of rotating a two-dimensional object about a line.

Unit 4- Connecting Algebra and Geometry Through Coordinates: Building on their work with the Pythagorean theorem in 8th grade to find distances, students use a rectangular coordinate system to verify geometric relationships, including properties of special triangles and quadrilaterals and slopes of parallel and perpendicular lines, which relates back to work done in the first course. Students continue their study of quadratics by connecting the geometric and algebraic definitions of the parabola.

Unit 5 Circles With and Without Coordinates: In this unit students prove basic theorems about circles, such as a tangent line is perpendicular to a radius, inscribed angle theorem, and theorems about chords, secants, and tangents dealing with segment lengths and angle measures. They study relationships among segments on chords, secants, and tangents as an application of similarity. In the Cartesian coordinate system, students use the distance formula to write the equation of a circle when given the radius and the coordinates of its center. Given an equation of a circle, they draw the graph in the coordinate plane, and apply techniques for solving quadratic equations, which relates back to work done in the first course, to determine intersections between lines and circles or parabolas and between two circles.

GENERAL NOTES

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link:
https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

Additional Instructional Resources:
A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGI/cms/review.html?Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

Florida Standards Implementation Guide Focus Section:

The Mathematics Florida Standards Implementation Guide was created to support the teaching and learning of the Mathematics Florida Standards. The guide is compartmentalized into three components: focus, coherence, and rigor.Focus means narrowing the scope of content in each grade or course, so students achieve higher levels of understanding and experience math concepts more deeply. The Mathematics standards allow for the teaching and learning of mathematical concepts focused around major clusters at each grade level, enhanced by supporting and additional clusters. The major, supporting and additional clusters are identified, in relation to each grade or course. The cluster designations for this course are below.

Major Clusters

MAFS.912.G-CO.2 Understand congruence in terms of rigid motions.

MAFS.912.G-CO.3 Prove geometric theorems.

MAFS.912.G-SRT.1 Understand similarity in terms of similarity transformations.

MAFS.912.G-SRT.2 Prove theorems involving similarity.

MAFS.912.G-SRT.3 Define trigonometric ratios and solve problems involving right triangles.

MAFS.912.G-GPE.2 Use coordinates to prove simple geometric theorems algebraically.

MAFS.G-MG.1 Apply geometric concepts in modeling situations.

Supporting Clusters

MAFS.912.G-CO.1 Experiment with transformations in the plane.

MAFS.G-CO.4 Make geometric constructions.

Additional Clusters

MAFS.912.G-C.1 Understand and apply theorems about circles.

MAFS.912.G-C.2 Find arc lengths and areas of sectors of circles.

MAFS.912.G-GPE.1 Translate between the geometric description and the equation of a conic section.

MAFS.912.G-GMD.1 Explain volume formulas and use them to solve problems.

MAFS.912.G-GMD.2 Visualize relationships between two-dimensional and three-dimensional objects.

Note: Clusters should not be sorted from major to supporting and then taught in that order. To do so would strip the coherence of the mathematical ideas and miss the opportunity to enhance the major work of the grade with the supporting and additional clusters.

GENERAL INFORMATION

Course Number: 1206320

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Geometry >

Abbreviated Title: GEO HON

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- Honors
- Class Size Core Required

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Geometry

Educator Certifications

Mathematics (Grades 6-12)
Middle Grades Mathematics (Middle Grades 5-9)

Geometry Honors (#1206320) 2022 - And Beyond

Course Standards

Name	Description
MA.912.GR.1.1:	Prove relationships and theorems about lines and angles. Solve mathematical and real-world problems involving postulates, relationships and theorems of lines and angles. **Clarifications:** *Clarification 1*: Postulates, relationships and theorems include vertical angles are congruent; when a transversal crosses parallel lines, the consecutive angles are supplementary and alternate (interior and exterior) angles and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints. *Clarification 2*: Instruction includes constructing two-column proofs, pictorial proofs, paragraph and narrative proofs, flow chart proofs or informal proofs. *Clarification 3*: Instruction focuses on helping a student choose a method they can use reliably.
MA.912.GR.1.2:	Prove triangle congruence or similarity using Side-Side-Side, Side-Angle-Side, Angle-Side-Angle, Angle-Angle-Side, Angle-Angle and Hypotenuse-Leg. **Clarifications:** *Clarification 1*: Instruction includes constructing two-column proofs, pictorial proofs, paragraph and narrative proofs, flow chart proofs or informal proofs. *Clarification 2*: Instruction focuses on helping a student choose a method they can use reliably.
MA.912.GR.1.3:	Prove relationships and theorems about triangles. Solve mathematical and real-world problems involving postulates, relationships and theorems of triangles. **Clarifications:** *Clarification 1*: Postulates, relationships and theorems include measures of interior angles of a triangle sum to 180°; measures of a set of exterior angles of a triangle sum to 360°; triangle inequality theorem; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point. *Clarification 2*: Instruction includes constructing two-column proofs, pictorial proofs, paragraph and narrative proofs, flow chart proofs or informal proofs. *Clarification 3*: Instruction focuses on helping a student choose a method they can use reliably.
MA.912.GR.1.4:	Prove relationships and theorems about parallelograms. Solve mathematical and real-world problems involving postulates, relationships and theorems of parallelograms. **Clarifications:** *Clarification 1*: Postulates, relationships and theorems include opposite sides are congruent, consecutive angles are supplementary, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and rectangles are parallelograms with congruent diagonals. *Clarification 2*: Instruction includes constructing two-column proofs, pictorial proofs, paragraph and narrative proofs, flow chart proofs or informal proofs. *Clarification 3*: Instruction focuses on helping a student choose a method they can use reliably.
MA.912.GR.1.5:	Prove relationships and theorems about trapezoids. Solve mathematical and real-world problems involving postulates, relationships and theorems of trapezoids. **Clarifications:** *Clarification 1*: Postulates, relationships and theorems include the Trapezoid Midsegment Theorem and for isosceles trapezoids: base angles are congruent, opposite angles are supplementary and diagonals are congruent. *Clarification 2*: Instruction includes constructing two-column proofs, pictorial proofs, paragraph and narrative proofs, flow chart proofs or informal proofs. *Clarification 3*: Instruction focuses on helping a student choose a method they can use reliably.
MA.912.GR.1.6:	Solve mathematical and real-world problems involving congruence or similarity in two-dimensional figures. **Clarifications:** *Clarification 1:* Instruction includes demonstrating that two-dimensional figures are congruent or similar based on given information.
MA.912.GR.2.1:	Given a preimage and image, describe the transformation and represent the transformation algebraically using coordinates. **Clarifications:** *Clarification 1*: Instruction includes the connection of transformations to functions that take points in the plane as inputs and give other points in the plane as outputs. *Clarification 2*: Transformations include translations, dilations, rotations and reflections described using words or using coordinates. *Clarification 3*: Within the Geometry course, rotations are limited to 90°, 180° and 270° counterclockwise or clockwise about the center of rotation, and the centers of rotations and dilations are limited to the origin or a point on the figure.
MA.912.GR.2.2:	Identify transformations that do or do not preserve distance. **Clarifications:** *Clarification 1*: Transformations include translations, dilations, rotations and reflections described using words or using coordinates. *Clarification 2*: Instruction includes recognizing that these transformations preserve angle measure.

MA.912.GR.2.3:	Identify a sequence of transformations that will map a given figure onto itself or onto another congruent or similar figure. **Clarifications:** *Clarification 1*: Transformations include translations, dilations, rotations and reflections described using words or using coordinates. *Clarification 2*: Within the Geometry course, figures are limited to triangles and quadrilaterals and rotations are limited to 90°, 180° and 270° counterclockwise or clockwise about the center of rotation. *Clarification 3*: Instruction includes the understanding that when a figure is mapped onto itself using a reflection, it occurs over a line of symmetry.
MA.912.GR.2.4:	Determine symmetries of reflection, symmetries of rotation and symmetries of translation of a geometric figure. **Clarifications:** *Clarification 1*: Instruction includes determining the order of each symmetry. *Clarification 2*: Instruction includes the connection between tessellations of the plane and symmetries of translations.
MA.912.GR.2.5:	Given a geometric figure and a sequence of transformations, draw the transformed figure on a coordinate plane. **Clarifications:** *Clarification 1*: Transformations include translations, dilations, rotations and reflections described using words or using coordinates. *Clarification 2*: Instruction includes two or more transformations.
MA.912.GR.2.6:	Apply rigid transformations to map one figure onto another to justify that the two figures are congruent. **Clarifications:** *Clarification 1*: Instruction includes showing that the corresponding sides and the corresponding angles are congruent.
MA.912.GR.2.7:	Justify the criteria for triangle congruence using the definition of congruence in terms of rigid transformations.
MA.912.GR.2.8:	Apply an appropriate transformation to map one figure onto another to justify that the two figures are similar. **Clarifications:** *Clarification 1*: Instruction includes showing that the corresponding sides are proportional, and the corresponding angles are congruent.
MA.912.GR.2.9:	Justify the criteria for triangle similarity using the definition of similarity in terms of non-rigid transformations.
MA.912.GR.3.1:	Determine the weighted average of two or more points on a line. **Clarifications:** *Clarification 1*: Instruction includes using a number line and determining how changing the weights moves the weighted average of points on the number line.
MA.912.GR.3.2:	Given a mathematical context, use coordinate geometry to classify or justify definitions, properties and theorems involving circles, triangles or quadrilaterals. **Clarifications:** *Clarification 1*: Instruction includes using the distance or midpoint formulas and knowledge of slope to classify or justify definitions, properties and theorems.
MA.912.GR.3.3:	Use coordinate geometry to solve mathematical and real-world geometric problems involving lines, circles, triangles and quadrilaterals. **Clarifications:** *Clarification 1*: Problems involving lines include the coordinates of a point on a line segment including the midpoint. *Clarification 2*: Problems involving circles include determining points on a given circle and finding tangent lines. *Clarification 3*: Problems involving triangles include median and centroid. *Clarification 4*: Problems involving quadrilaterals include using parallel and perpendicular slope criteria.
MA.912.GR.3.4:	Use coordinate geometry to solve mathematical and real-world problems on the coordinate plane involving perimeter or area of polygons.
MA.912.GR.4.1:	Identify the shapes of two-dimensional cross-sections of three-dimensional figures. **Clarifications:** *Clarification 1*: Instruction includes the use of manipulatives and models to visualize cross-sections. *Clarification 2*: Instruction focuses on cross-sections of right cylinders, right prisms, right pyramids and right cones that are parallel or perpendicular to the base.
MA.912.GR.4.2:	Identify three-dimensional objects generated by rotations of two-dimensional figures. **Clarifications:** *Clarification 1*: The axis of rotation must be within the same plane but outside of the given two-dimensional figure.
MA.912.GR.4.3:	Extend previous understanding of scale drawings and scale factors to determine how dilations affect the area of two-dimensional figures and the surface area or volume of three-dimensional figures.
MA.912.GR.4.4:	Solve mathematical and real-world problems involving the area of two-dimensional figures. **Clarifications:** *Clarification 1*: Instruction includes concepts of population density based on area.
MA.912.GR.4.5:	Solve mathematical and real-world problems involving the volume of three-dimensional figures limited to cylinders, pyramids, prisms, cones and spheres. **Clarifications:** *Clarification 1:* Instruction includes concepts of density based on volume. *Clarification 2:* Instruction includes using Cavalieri's Principle to give informal arguments about the formulas for the volumes of right and non-right cylinders, pyramids, prisms and cones.
MA.912.GR.4.6:	Solve mathematical and real-world problems involving the surface area of three-dimensional figures limited to cylinders, pyramids, prisms, cones and spheres.
	Construct a copy of a segment or an angle.

MA.912.GR.5.1:	**Clarifications:** *Clarification 1*: Instruction includes using compass and straightedge, string, reflective devices, paper folding or dynamic geometric software.
MA.912.GR.5.2:	Construct the bisector of a segment or an angle, including the perpendicular bisector of a line segment. **Clarifications:** *Clarification 1*: Instruction includes using compass and straightedge, string, reflective devices, paper folding or dynamic geometric software.
MA.912.GR.5.3:	Construct the inscribed and circumscribed circles of a triangle. **Clarifications:** *Clarification 1*: Instruction includes using compass and straightedge, string, reflective devices, paper folding or dynamic geometric software.
MA.912.GR.5.4:	Construct a regular polygon inscribed in a circle. Regular polygons are limited to triangles, quadrilaterals and hexagons. **Clarifications:** *Clarification 1*: When given a circle, the center must be provided. *Clarification 2*: Instruction includes using compass and straightedge, string, reflective devices, paper folding or dynamic geometric software.
MA.912.GR.5.5:	Given a point outside a circle, construct a line tangent to the circle that passes through the given point. **Clarifications:** *Clarification 1*: When given a circle, the center must be provided. *Clarification 2*: Instruction includes using compass and straightedge, string, reflective devices, paper folding or dynamic geometric software.
MA.912.GR.6.1:	Solve mathematical and real-world problems involving the length of a secant, tangent, segment or chord in a given circle. **Clarifications:** *Clarification 1:* Problems include relationships between two chords; two secants; a secant and a tangent; and the length of the tangent from a point to a circle.
MA.912.GR.6.2:	Solve mathematical and real-world problems involving the measures of arcs and related angles. **Clarifications:** *Clarification 1*: Within the Geometry course, problems are limited to relationships between inscribed angles; central angles; and angles formed by the following intersections: a tangent and a secant through the center, two tangents, and a chord and its perpendicular bisector.
MA.912.GR.6.3:	Solve mathematical problems involving triangles and quadrilaterals inscribed in a circle. **Clarifications:** *Clarification 1*: Instruction includes cases in which a triangle inscribed in a circle has a side that is the diameter.
MA.912.GR.6.4:	Solve mathematical and real-world problems involving the arc length and area of a sector in a given circle. **Clarifications:** *Clarification 1*: Instruction focuses on the conceptual understanding that for a given angle measure the length of the intercepted arc is proportional to the radius, and for a given radius the length of the intercepted arc is proportional is the angle measure.
MA.912.GR.6.5:	Apply transformations to prove that all circles are similar.
MA.912.GR.7.2:	Given a mathematical or real-world context, derive and create the equation of a circle using key features. **Clarifications:** *Clarification 1:* Instruction includes using the Pythagorean Theorem and completing the square. *Clarification 2:* Within the Geometry course, key features are limited to the radius, diameter and the center.
MA.912.GR.7.3:	Graph and solve mathematical and real-world problems that are modeled with an equation of a circle. Determine and interpret key features in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain, range, eccentricity, center and radius. *Clarification 2*: Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation. *Clarification 3*: Within the Geometry course, notations for domain and range are limited to inequality and set-builder.
MA.912.LT.4.3:	Identify and accurately interpret “if…then,” “if and only if,” “all” and “not” statements. Find the converse, inverse and contrapositive of a statement. **Clarifications:** *Clarification 1:* Instruction focuses on recognizing the relationships between an “if…then” statement and the converse, inverse and contrapositive of that statement. *Clarification 2:* Within the Geometry course, instruction focuses on the connection to proofs within the course.
MA.912.LT.4.8:	Construct proofs, including proofs by contradiction. **Clarifications:** *Clarification 1*: Within the Geometry course, proofs are limited to geometric statements within the course.
MA.912.LT.4.10:	Judge the validity of arguments and give counterexamples to disprove statements. **Clarifications:** *Clarification 1:* Within the Geometry course, instruction focuses on the connection to proofs within the course.
MA.912.T.1.1:	Define trigonometric ratios for acute angles in right triangles. **Clarifications:** *Clarification 1*: Instruction includes using the Pythagorean Theorem and using similar triangles to demonstrate that trigonometric ratios stay the same for similar right triangles. *Clarification 2*: Within the Geometry course, instruction includes using the coordinate plane to make connections to the unit circle. *Clarification 3*: Within the Geometry course, trigonometric ratios are limited to sine, cosine and tangent.
	Solve mathematical and real-world problems involving right triangles using trigonometric ratios and the Pythagorean Theorem.

MA.912.T.1.2:	**Clarifications:** *Clarification 1*: Instruction includes procedural fluency with the relationships of side lengths in special right triangles having angle measures of 30°-60°-90° and 45°-45°-90°.
MA.912.T.1.3:	Apply the Law of Sines and the Law of Cosines to solve mathematical and real-world problems involving triangles.
MA.912.T.1.4:	Solve mathematical problems involving finding the area of a triangle given two sides and the included angle. **Clarifications:** *Clarification 1:* Problems include right triangles, heights inside of a triangle and heights outside of a triangle.
MA.K12.MTR.1.1:	Mathematicians who participate in effortful learning both individually and with others: • Analyze the problem in a way that makes sense given the task. • Ask questions that will help with solving the task. • Build perseverance by modifying methods as needed while solving a challenging task. • Stay engaged and maintain a positive mindset when working to solve tasks. • Help and support each other when attempting a new method or approach. **Clarifications:** Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: • Build understanding through modeling and using manipulatives. • Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. • Progress from modeling problems with objects and drawings to using algorithms and equations. • Express connections between concepts and representations. • Choose a representation based on the given context or purpose. **Clarifications:** Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations. **Clarifications:** Teachers who encourage students to complete tasks with mathematical fluency: • Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. • Offer multiple opportunities for students to practice efficient and generalizable methods. • Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: • Communicate mathematical ideas, vocabulary and methods effectively. • Analyze the mathematical thinking of others. • Compare the efficiency of a method to those expressed by others. • Recognize errors and suggest how to correctly solve the task. • Justify results by explaining methods and processes. • Construct possible arguments based on evidence. **Clarifications:** Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations.

	Clarifications: Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. **Clarifications:** Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems. • Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. **Clarifications:** Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. **Clarifications:** K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. **Clarifications:** See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. **Clarifications:** Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. **Clarifications:** In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think _______ because ______." The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. **Clarifications:** Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
	Use appropriate voice and tone when speaking or writing.

ELA.K12.EE.6.1:	**Clarifications:** In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

General Course Information and Notes

VERSION DESCRIPTION

In Geometry Honors, instructional time will emphasize five areas: (1) proving and applying relationships and theorems involving two-dimensional figures using Euclidean geometry and coordinate geometry; (2) establishing congruence and similarity using criteria from Euclidean geometry and using rigid transformations; (3) extending knowledge of geometric measurement to two-dimensional figures and three-dimensional figures; (4) creating and applying equations of circles in the coordinate plane and (5) developing an understanding of right triangle trigonometry.

All clarifications stated, whether general or specific to Geometry Honors, are expectations for instruction of that benchmark.

Curricular content for all subjects must integrate critical-thinking, problem-solving, and workforce-literacy skills; communication, reading, and writing skills; mathematics skills; collaboration skills; contextual and applied-learning skills; technology-literacy skills; information and media-literacy skills; and civic-engagement skills.

GENERAL NOTES

Honors and Accelerated Level Course Note: Accelerated courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Number: 1206320

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Geometry >

Abbreviated Title: GEO HONORS

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- Honors
- Class Size Core Required

Course Type: Core Academic Course

Course Level: 3

Course Status: State Board Approved

Graduation Requirement: Geometry

Educator Certifications

Mathematics (Grades 6-12)
Middle Grades Mathematics (Middle Grades 5-9)

International Baccalaureate Mid Yrs Prog Geometry (#1206810) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The curriculum description for this IB course is provided at http://www.ibo.org/en/programmes/.

GENERAL INFORMATION

Course Number: 1206810

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Geometry >

Abbreviated Title: IB MYP GEOM

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- International Baccalaureate (IB)

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Geometry

Educator Certifications

Middle Grades Mathematics (Middle Grades 5-9)
Mathematics (Grades 6-12)

Mathematics for College Liberal Arts (#1207350) 2022 - And Beyond (current)

Course Standards

Name	Description
MA.912.AR.2.5:	Solve and graph mathematical and real-world problems that are modeled with linear functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain, range, intercepts and rate of change. *Clarification 2*: Instruction includes the use of standard form, slope-intercept form and point-slope form. *Clarification 3*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation. *Clarification 4*: Within the Algebra 1 course, notations for domain, range and constraints are limited to inequality and set-builder. *Clarification 5*: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.5.3:	Given a mathematical or real-world context, classify an exponential function as representing growth or decay. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, exponential functions are limited to the forms $f(x) = ab^x$, where *b* is a whole number greater than 1 or a unit fraction, or $f(x) = a(1 \pm r)^x$, where $0 < r < 1$.
MA.912.AR.5.4:	Write an exponential function to represent a relationship between two quantities from a graph, a written description or a table of values within a mathematical or real-world context. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, exponential functions are limited to the forms $f(x) = ab^x$, where *b* is a whole number greater than 1 or a unit fraction, or $f(x) = a(1 \pm r)^x$, where $0 < r < 1$. *Clarification 2:* Within the Algebra 1 course, tables are limited to having successive nonnegative integer inputs so that the function may be determined by finding ratios between successive outputs.
MA.912.AR.5.5:	Given an expression or equation representing an exponential function, reveal the constant percent rate of change per unit interval using the properties of exponents. Interpret the constant percent rate of change in terms of a real-world context.
MA.912.AR.5.6:	Given a table, equation or written description of an exponential function, graph that function and determine its key features. **Clarifications:** *Clarification 1:* Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; constant percent rate of change; end behavior and asymptotes. *Clarification 2:* Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation. *Clarification 3:* Within the Algebra 1 course, notations for domain and range are limited to inequality and set-builder. *Clarification 4:* Within the Algebra 1 course, exponential functions are limited to the forms $f(x) = ab^x$, where *b* is a whole number greater than 1 or a unit fraction or $f(x) = a(1 \pm r)^x$, where $0 < r < 1$.
MA.912.DP.1.1:	Given a set of data, select an appropriate method to represent the data, depending on whether it is numerical or categorical data and on whether it is univariate or bivariate. **Clarifications:** *Clarification 1:* Instruction includes discussions regarding the strengths and weaknesses of each data display. *Clarification 2:* Numerical univariate includes histograms, stem-and-leaf plots, box plots and line plots; numerical bivariate includes scatter plots and line graphs; categorical univariate includes bar charts, circle graphs, line plots, frequency tables and relative frequency tables; and categorical bivariate includes segmented bar charts, joint frequency tables and joint relative frequency tables. *Clarification 3:* Instruction includes the use of appropriate units and labels and, where appropriate, using technology to create data displays.
MA.912.DP.1.2:	Interpret data distributions represented in various ways. State whether the data is numerical or categorical, whether it is univariate or bivariate and interpret the different components and quantities in the display. **Clarifications:** *Clarification 1*: Within the Probability and Statistics course, instruction includes the use of spreadsheets and technology.
MA.912.DP.2.1:	For two or more sets of numerical univariate data, calculate and compare the appropriate measures of center and measures of variability, accounting for possible effects of outliers. Interpret any notable features of the shape of the data distribution. **Clarifications:** *Clarification 1*: The measure of center is limited to mean and median. The measure of variation is limited to range, interquartile range, and standard deviation. *Clarification 2*: Shape features include symmetry or skewness and clustering. *Clarification 3*: Within the Probability and Statistics course, instruction includes the use of spreadsheets and technology.

MA.912.DP.2.4:	Fit a linear function to bivariate numerical data that suggests a linear association and interpret the slope and y-intercept of the model. Use the model to solve real-world problems in terms of the context of the data. **Clarifications:** *Clarification 1*: Instruction includes fitting a linear function both informally and formally with the use of technology. *Clarification 2*: Problems include making a prediction or extrapolation, inside and outside the range of the data, based on the equation of the line of fit.
MA.912.DP.2.9:	Fit an exponential function to bivariate numerical data that suggests an exponential association. Use the model to solve real-world problems in terms of the context of the data. **Clarifications:** *Clarification 1*: Instruction focuses on determining whether an exponential model is appropriate by taking the logarithm of the dependent variable using spreadsheets and other technology. *Clarification 2*: Instruction includes determining whether the transformed scatterplot has an appropriate line of best fit, and interpreting the y-intercept and slope of the line of best fit. *Clarification 3*: Problems include making a prediction or extrapolation, inside and outside the range of the data, based on the equation of the line of fit.
MA.912.DP.4.1:	Describe events as subsets of a sample space using characteristics, or categories, of the outcomes, or as unions, intersections or complements of other events.
MA.912.DP.4.2:	Determine if events A and B are independent by calculating the product of their probabilities.
MA.912.DP.4.3:	Calculate the conditional probability of two events and interpret the result in terms of its context.
MA.912.DP.4.4:	Interpret the independence of two events using conditional probability.
MA.912.DP.4.5:	Given a two-way table containing data from a population, interpret the joint and marginal relative frequencies as empirical probabilities and the conditional relative frequencies as empirical conditional probabilities. Use those probabilities to determine whether characteristics in the population are approximately independent. **Clarifications:** *Clarification 1*: Instruction includes the connection between mathematical probability and applied statistics.
MA.912.DP.4.6:	Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.
MA.912.DP.4.7:	Apply the addition rule for probability, taking into consideration whether the events are mutually exclusive, and interpret the result in terms of the model and its context.
MA.912.DP.4.8:	Apply the general multiplication rule for probability, taking into consideration whether the events are independent, and interpret the result in terms of the context.
MA.912.DP.4.9:	Apply the addition and multiplication rules for counting to solve mathematical and real-world problems, including problems involving probability.
MA.912.DP.4.10:	Given a mathematical or real-world situation, calculate the appropriate permutation or combination.
MA.912.F.1.6:	Compare key features of linear and nonlinear functions each represented algebraically, graphically, in tables or written descriptions. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; end behavior and asymptotes. *Clarification 2*: Within the Algebra 1 course, functions other than linear, quadratic or exponential must be represented graphically. *Clarification 3*: Within the Algebra 1 course, instruction includes verifying that a quantity increasing exponentially eventually exceeds a quantity increasing linearly or quadratically.
MA.912.F.1.8:	Determine whether a linear, quadratic or exponential function best models a given real-world situation. **Clarifications:** *Clarification 1*: Instruction includes recognizing that linear functions model situations in which a quantity changes by a constant amount per unit interval; that quadratic functions model situations in which a quantity increases to a maximum, then begins to decrease or a quantity decreases to a minimum, then begins to increase; and that exponential functions model situations in which a quantity grows or decays by a constant percent per unit interval. *Clarification 2*: Within this benchmark, the expectation is to identify the type of function from a written description or table.
MA.912.FL.3.1:	Compare simple, compound and continuously compounded interest over time. **Clarifications:** *Clarification 1*: Instruction includes taking into consideration the annual percentage rate (APR) when comparing simple and compound interest.
MA.912.FL.3.2:	Solve real-world problems involving simple, compound and continuously compounded interest. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, interest is limited to simple and compound.
MA.912.FL.3.4:	Explain the relationship between simple interest and linear growth. Explain the relationship between compound interest and exponential growth and the relationship between continuously compounded interest and exponential growth. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, exponential growth is limited to compound interest.
MA.912.GR.1.6:	Solve mathematical and real-world problems involving congruence or similarity in two-dimensional figures. **Clarifications:** *Clarification 1:* Instruction includes demonstrating that two-dimensional figures are congruent or similar based on given information.
MA.912.GR.2.4:	Determine symmetries of reflection, symmetries of rotation and symmetries of translation of a geometric figure. **Clarifications:** *Clarification 1*: Instruction includes determining the order of each symmetry. *Clarification 2*: Instruction includes the connection between tessellations of the plane and symmetries of translations.

MA.912.GR.4.3:	Extend previous understanding of scale drawings and scale factors to determine how dilations affect the area of two-dimensional figures and the surface area or volume of three-dimensional figures.
MA.912.GR.4.4:	Solve mathematical and real-world problems involving the area of two-dimensional figures. **Clarifications:** *Clarification 1*: Instruction includes concepts of population density based on area.
MA.912.GR.4.5:	Solve mathematical and real-world problems involving the volume of three-dimensional figures limited to cylinders, pyramids, prisms, cones and spheres. **Clarifications:** *Clarification 1:* Instruction includes concepts of density based on volume. *Clarification 2:* Instruction includes using Cavalieri's Principle to give informal arguments about the formulas for the volumes of right and non-right cylinders, pyramids, prisms and cones.
MA.912.GR.4.6:	Solve mathematical and real-world problems involving the surface area of three-dimensional figures limited to cylinders, pyramids, prisms, cones and spheres.
MA.912.LT.4.1:	Translate propositional statements into logical arguments using propositional variables and logical connectives.
MA.912.LT.4.2:	Determine truth values of simple and compound statements using truth tables.
MA.912.LT.4.3:	Identify and accurately interpret "if...then," "if and only if," "all" and "not" statements. Find the converse, inverse and contrapositive of a statement. **Clarifications:** *Clarification 1:* Instruction focuses on recognizing the relationships between an "if...then" statement and the converse, inverse and contrapositive of that statement. *Clarification 2:* Within the Geometry course, instruction focuses on the connection to proofs within the course.
MA.912.LT.4.4:	Represent logic operations, such as AND, OR, NOT, NOR, and XOR, using logical symbolism to solve problems.
MA.912.LT.4.5:	Determine whether two propositions are logically equivalent.
MA.912.LT.4.9:	Construct logical arguments using laws of detachment, syllogism, tautology, contradiction and Euler Diagrams.
MA.912.LT.4.10:	Judge the validity of arguments and give counterexamples to disprove statements. **Clarifications:** *Clarification 1:* Within the Geometry course, instruction focuses on the connection to proofs within the course.
MA.912.LT.5.1:	Given two sets, determine whether the two sets are equivalent and whether one set is a subset of another. Given one set, determine its power set.
MA.912.LT.5.4:	Perform the set operations of taking the complement of a set and the union, intersection, difference and product of two sets. **Clarifications:** *Clarification 1*: Instruction includes the connection to probability and the words AND, OR and NOT.
MA.912.LT.5.5:	Explore relationships and patterns and make arguments about relationships between sets using Venn Diagrams.
MA.912.LT.5.6:	Prove set relations, including DeMorgan's Laws and equivalence relations.
MA.912.T.1.2:	Solve mathematical and real-world problems involving right triangles using trigonometric ratios and the Pythagorean Theorem. **Clarifications:** *Clarification 1*: Instruction includes procedural fluency with the relationships of side lengths in special right triangles having angle measures of 30°-60°-90° and 45°-45°-90°.
MA.K12.MTR.1.1:	Mathematicians who participate in effortful learning both individually and with others: • Analyze the problem in a way that makes sense given the task. • Ask questions that will help with solving the task. • Build perseverance by modifying methods as needed while solving a challenging task. • Stay engaged and maintain a positive mindset when working to solve tasks. • Help and support each other when attempting a new method or approach. **Clarifications:** Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: • Build understanding through modeling and using manipulatives. • Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. • Progress from modeling problems with objects and drawings to using algorithms and equations. • Express connections between concepts and representations. • Choose a representation based on the given context or purpose. **Clarifications:** Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.
	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations.

MA.K12.MTR.3.1:	- Complete tasks accurately and with confidence. - Adapt procedures to apply them to a new context. - Use feedback to improve efficiency when performing calculations. **Clarifications:** Teachers who encourage students to complete tasks with mathematical fluency: - Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. - Offer multiple opportunities for students to practice efficient and generalizable methods. - Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: - Communicate mathematical ideas, vocabulary and methods effectively. - Analyze the mathematical thinking of others. - Compare the efficiency of a method to those expressed by others. - Recognize errors and suggest how to correctly solve the task. - Justify results by explaining methods and processes. - Construct possible arguments based on evidence. **Clarifications:** Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: - Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. - Create opportunities for students to discuss their thinking with peers. - Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. - Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: - Focus on relevant details within a problem. - Create plans and procedures to logically order events, steps or ideas to solve problems. - Decompose a complex problem into manageable parts. - Relate previously learned concepts to new concepts. - Look for similarities among problems. - Connect solutions of problems to more complicated large-scale situations. **Clarifications:** Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: - Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. - Support students to develop generalizations based on the similarities found among problems. - Provide opportunities for students to create plans and procedures to solve problems. - Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: - Estimate to discover possible solutions. - Use benchmark quantities to determine if a solution makes sense. - Check calculations when solving problems. - Verify possible solutions by explaining the methods used. - Evaluate results based on the given context. **Clarifications:** Teachers who encourage students to assess the reasonableness of solutions: - Have students estimate or predict solutions prior to solving. - Prompt students to continually ask, "Does this solution make sense? How do you know?" - Reinforce that students check their work as they progress within and after a task. - Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: - Connect mathematical concepts to everyday experiences. - Use models and methods to understand, represent and solve problems. - Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. **Clarifications:** Teachers who encourage students to apply mathematics to real-world contexts: - Provide opportunities for students to create models, both concrete and abstract, and perform investigations. - Challenge students to question the accuracy of their models and methods. - Support students as they validate conclusions by comparing them to the given situation. - Indicate how various concepts can be applied to other disciplines.
	Cite evidence to explain and justify reasoning. **Clarifications:** K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In

ELA.K12.EE.1.1:	3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. **Clarifications:** See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. **Clarifications:** Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. **Clarifications:** In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think _______ because ______." The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. **Clarifications:** Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. **Clarifications:** In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

General Course Information and Notes

VERSION DESCRIPTION

In Mathematics for College Liberal Arts, instructional time will emphasize five areas: (1) analyzing and applying linear and exponential functions within a real-world context; (2) utilizing geometric concepts to solve real-world problems; (3) extending understanding of probability theory; (4) representing and interpreting univariate and bivariate data and (5) developing understanding of logic and set theory.

All clarifications stated, whether general or specific to Mathematics for College Liberal Arts, are expectations for instruction of that benchmark.

Curricular content for all subjects must integrate critical-thinking, problem-solving, and workforce-literacy skills; communication, reading, and writing skills; mathematics skills; collaboration skills; contextual and applied-learning skills; technology-literacy skills; information and media-literacy skills; and civic-engagement skills.

GENERAL NOTES

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards
This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Number: 1207350

Course Path: **Section:** Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Liberal Arts Mathematics >

Abbreviated Title: MATH FOR COLL LIB ARTS

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- Class Size Core Required

Course Type: Core Academic Course

Course Level: 2

Course Status: State Board Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Mathematics

Educator Certifications

Mathematics (Grades 6-12)

International Baccalaureate Mathematics: Applications and Interpretation 1 (#1209300) 2019 - And Beyond (current)

General Course Information and Notes

VERSION DESCRIPTION

The curriculum description for this IB course is provided at http://www.ibo.org/en/programmes/.

GENERAL INFORMATION

Course Number: 1209300

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Mathematical Studies/Applications >

Abbreviated Title: IB MATH: APPS/INT 1

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- International Baccalaureate (IB)

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Mathematics

Educator Certifications

Mathematics (Grades 6-12)

International Baccalaureate Mathematics: Applications and Interpretation 2 (#1209305) 2019 - And Beyond (current)

General Course Information and Notes

VERSION DESCRIPTION

The curriculum description for this IB course is provided at http://www.ibo.org/en/programmes/.

GENERAL INFORMATION

Course Number: 1209305

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Mathematical Studies/Applications >

Abbreviated Title: IB MATH: APPS/INT 2

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- International Baccalaureate (IB)

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Mathematics

Educator Certifications

Mathematics (Grades 6-12)

International Baccalaureate Mathematics: Applications and Interpretation 3 (#1209310) 2019 - And Beyond (current)

General Course Information and Notes

VERSION DESCRIPTION

The curriculum description for this IB course is provided at http://www.ibo.org/en/programmes/.

GENERAL INFORMATION

Course Number: 1209310

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Mathematical Studies/Applications >

Abbreviated Title: IB MATH: APPS/INT 3

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- International Baccalaureate (IB)

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Mathematics

Educator Certifications

Mathematics (Grades 6-12)

Cambridge Pre-AICE Mathematics 1 IGCSE Level (#1209810) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

For more information about this Cambridge course, visit http://www.cie.org.uk/programmes-and-qualifications/cambridge-secondary-2/cambridge-igcse/curriculum/.

GENERAL INFORMATION

Course Number: 1209810

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Algebra >

Abbreviated Title: PRE-AICE MATH 1 IG

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- Advanced International Certificate of Education (AICE)

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 9,10,11,12

Educator Certifications

Mathematics (Grades 6-12)
Middle Grades Mathematics (Middle Grades 5-9)

Equivalent Courses

1200310-Algebra 1 Equivalency start year: 2014
1200386-Pre-Advanced Placement Algebra 1 Equivalency start year: 2018

Cambridge Pre-AICE Mathematics 2 IGCSE Level (#1209820) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

For more information about this Cambridge course, visit http://www.cie.org.uk/programmes-and-qualifications/cambridge-secondary-2/cambridge-igcse/curriculum/.

GENERAL INFORMATION

Course Number: 1209820

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Geometry >

Abbreviated Title: PRE-AICE MATH 2 IG

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- Advanced International Certificate of Education (AICE)

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Geometry

Educator Certifications

Mathematics (Grades 6-12)

Cambridge Pre-AICE Mathematics 3 IGCSE Level (#1209825) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

For more information about this Cambridge course, visit http://www.cie.org.uk/programmes-and-qualifications/cambridge-secondary-2/cambridge-igcse/curriculum/.

GENERAL INFORMATION

Course Number: 1209825

Course Path: **Section:** Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Algebra >

Abbreviated Title: PRE-AICE MATH 3 IG

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- Advanced International Certificate of Education (AICE)

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Mathematics

Educator Certifications

Mathematics (Grades 6-12)
Middle Grades Mathematics (Middle Grades 5-9)

Probability & Statistics with Applications Honors (#1210300) 2019 - 2022 (current)

Course Standards

Name	Description
MAFS.912.S-CP.1.1:	Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events (“or,” “and,” “not”). ★
MAFS.912.S-CP.1.2:	Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent. ★
MAFS.912.S-CP.1.3:	Understand the conditional probability of A given B as P(A and B)/P(B), and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B. ★
MAFS.912.S-CP.1.4:	Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. *For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.* ★
MAFS.912.S-CP.1.5:	Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. *For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.* ★
MAFS.912.S-CP.2.6:	Find the conditional probability of A given B as the fraction of B’s outcomes that also belong to A, and interpret the answer in terms of the model. ★
MAFS.912.S-CP.2.7:	Apply the Addition Rule, P(A or B) = P(A) + P(B) – P(A and B), and interpret the answer in terms of the model. ★
MAFS.912.S-CP.2.8:	Apply the general Multiplication Rule in a uniform probability model, P(A and B) = P(A)P(B|A) = P(B)P(A|B), and interpret the answer in terms of the model. ★
MAFS.912.S-CP.2.9:	Use permutations and combinations to compute probabilities of compound events and solve problems. ★
MAFS.912.S-IC.1.1:	Understand statistics as a process for making inferences about population parameters based on a random sample from that population. ★
MAFS.912.S-IC.1.2:	Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. *For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model* ★
MAFS.912.S-IC.2.3:	Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each. ★
MAFS.912.S-IC.2.4:	Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling. ★
MAFS.912.S-IC.2.5:	Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant. ★
MAFS.912.S-IC.2.6:	Evaluate reports based on data. ★
MAFS.912.S-ID.1.1:	Represent data with plots on the real number line (dot plots, histograms, and box plots). ★ **Clarifications:** In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.2:	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. ★ **Clarifications:** In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.3:	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). ★ **Clarifications:** In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points.
MAFS.912.S-ID.1.4:	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. ★
MAFS.912.S-ID.2.5:	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. ★
MAFS.912.S-ID.2.6:	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. ★ a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. *Use given functions or choose a function suggested by the context. Emphasize linear, and exponential models.* b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association. **Clarifications:** Students take a more sophisticated look at using a linear function to model the relationship between two numerical variables. In addition to fitting a line to data, students assess how well the model fits by analyzing residuals.
MAFS.912.S-ID.3.7:	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. ★
MAFS.912.S-ID.3.8:	Compute (using technology) and interpret the correlation coefficient of a linear fit. ★
MAFS.912.S-ID.3.9:	Distinguish between correlation and causation. ★

MAFS.912.S-MD.1.1:	Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions. ★
MAFS.912.S-MD.1.2:	Calculate the expected value of a random variable; interpret it as the mean of the probability distribution. ★
MAFS.912.S-MD.1.3:	Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value. *For example, find the theoretical probability distribution for the number of correct answers obtained by guessing on all five questions of a multiple-choice test where each question has four choices, and find the expected grade under various grading schemes.* ★
MAFS.912.S-MD.1.4:	Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value. *For example, find a current data distribution on the number of TV sets per household in the United States, and calculate the expected number of sets per household. How many TV sets would you expect to find in 100 randomly selected households?* ★
MAFS.912.S-MD.2.5:	Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values. ★ a. Find the expected payoff for a game of chance. *For example, find the expected winnings from a state lottery ticket or a game at a fast-food restaurant.* b. Evaluate and compare strategies on the basis of expected values. *For example, compare a high-deductible versus a low-deductible automobile insurance policy using various, but reasonable, chances of having a minor or a major accident.*
MAFS.912.S-MD.2.6:	Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator). ★
MAFS.912.S-MD.2.7:	Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game). ★
MAFS.K12.MP.1.1:	**Make sense of problems and persevere in solving them.** Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
MAFS.K12.MP.2.1:	**Reason abstractly and quantitatively**. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
MAFS.K12.MP.3.1:	**Construct viable arguments and critique the reasoning of others.** Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
MAFS.K12.MP.4.1:	**Model with mathematics.** Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
MAFS.K12.MP.5.1:	**Use appropriate tools strategically.** Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.
MAFS.K12.MP.6.1:	**Attend to precision.** Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give

	carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
MAFS.K12.MP.7.1:	**Look for and make use of structure.** Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 – 3(x – y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
MAFS.K12.MP.8.1:	**Look for and express regularity in repeated reasoning.** Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y – 2)/(x – 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x – 1)(x + 1)$, $(x – 1)(x^2 + x + 1)$, and $(x – 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
LAFS.1112.RST.1.3:	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
LAFS.1112.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
LAFS.1112.RST.3.7:	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
LAFS.1112.WHST.1.1:	Write arguments focused on *discipline-specific content.* a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience’s knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.
LAFS.1112.WHST.2.4:	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LAFS.1112.WHST.3.9:	Draw evidence from informational texts to support analysis, reflection, and research.
LAFS.910.SL.1.1:	Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others’ ideas and expressing their own clearly and persuasively. a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. b. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed. c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions. d. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.
LAFS.910.SL.1.2:	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
LAFS.910.SL.1.3:	Evaluate a speaker’s point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.
LAFS.910.SL.2.4:	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.

General Course Information and Notes

GENERAL NOTES

Honors and Advanced Level Course Note: Advanced courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

English Language Development ELD Standards Special Notes Section:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and

concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

Additional Instructional Resources:
A.V.E. for Success Collection is provided by the Florida Association of School Administrators: http://www.fasa.net/4DCGI/cms/review.html?Action=CMS_Document&DocID=139. Please be aware that these resources have not been reviewed by CPALMS and there may be a charge for the use of some of them in this collection.

GENERAL INFORMATION

Course Number: 1210300

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Probablility and Statistics >

Abbreviated Title: PROB STAT W/APPS HON

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- Honors

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Mathematics

Educator Certifications

Mathematics (Grades 6-12)

Equivalent Courses

1210320-Advanced Placement Statistics
1210330-Cambridge AICE Mathematics Statistics AS Level

Probability and Statistics Honors (#1210300) 2022 - And Beyond

Course Standards

Name	Description
MA.912.DP.1.1:	Given a set of data, select an appropriate method to represent the data, depending on whether it is numerical or categorical data and on whether it is univariate or bivariate. **Clarifications:** *Clarification 1:* Instruction includes discussions regarding the strengths and weaknesses of each data display. *Clarification 2:* Numerical univariate includes histograms, stem-and-leaf plots, box plots and line plots; numerical bivariate includes scatter plots and line graphs; categorical univariate includes bar charts, circle graphs, line plots, frequency tables and relative frequency tables; and categorical bivariate includes segmented bar charts, joint frequency tables and joint relative frequency tables. *Clarification 3:* Instruction includes the use of appropriate units and labels and, where appropriate, using technology to create data displays.
MA.912.DP.1.2:	Interpret data distributions represented in various ways. State whether the data is numerical or categorical, whether it is univariate or bivariate and interpret the different components and quantities in the display. **Clarifications:** *Clarification 1*: Within the Probability and Statistics course, instruction includes the use of spreadsheets and technology.
MA.912.DP.1.3:	Explain the difference between correlation and causation in the contexts of both numerical and categorical data.
MA.912.DP.1.4:	Estimate a population total, mean or percentage using data from a sample survey; develop a margin of error through the use of simulation. **Clarifications:** *Clarification 1:* Within the Algebra 1 course, the margin of error will be given.
MA.912.DP.1.5:	Interpret the margin of error of a mean or percentage from a data set. Interpret the confidence level corresponding to the margin of error.
MA.912.DP.2.1:	For two or more sets of numerical univariate data, calculate and compare the appropriate measures of center and measures of variability, accounting for possible effects of outliers. Interpret any notable features of the shape of the data distribution. **Clarifications:** *Clarification 1*: The measure of center is limited to mean and median. The measure of variation is limited to range, interquartile range, and standard deviation. *Clarification 2*: Shape features include symmetry or skewness and clustering. *Clarification 3*: Within the Probability and Statistics course, instruction includes the use of spreadsheets and technology.
MA.912.DP.2.2:	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. **Clarifications:** *Clarification 1*: Instruction includes the connection to the binomial distribution and surveys.
MA.912.DP.2.3:	Estimate population percentages from data that has been fit to the normal distribution. **Clarifications:** *Clarification 1*: Instruction includes using technology, empirical rules or tables to estimate areas under the normal curve.
MA.912.DP.2.4:	Fit a linear function to bivariate numerical data that suggests a linear association and interpret the slope and y-intercept of the model. Use the model to solve real-world problems in terms of the context of the data. **Clarifications:** *Clarification 1*: Instruction includes fitting a linear function both informally and formally with the use of technology. *Clarification 2*: Problems include making a prediction or extrapolation, inside and outside the range of the data, based on the equation of the line of fit.
MA.912.DP.2.5:	Given a scatter plot that represents bivariate numerical data, assess the fit of a given linear function by plotting and analyzing residuals. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, instruction includes determining the number of positive and negative residuals; the largest and smallest residuals; and the connection between outliers in the data set and the corresponding residuals.
MA.912.DP.2.6:	Given a scatter plot with a line of fit and residuals, determine the strength and direction of the correlation. Interpret strength and direction within a real-world context. **Clarifications:** *Clarification 1*: Instruction focuses on determining the direction by analyzing the slope and informally determining the strength by analyzing the residuals.
MA.912.DP.2.7:	Compute the correlation coefficient of a linear model using technology. Interpret the strength and direction of the correlation coefficient.
MA.912.DP.2.9:	Fit an exponential function to bivariate numerical data that suggests an exponential association. Use the model to solve real-world problems in terms of the context of the data. **Clarifications:** *Clarification 1*: Instruction focuses on determining whether an exponential model is appropriate by taking the logarithm of the dependent variable using spreadsheets and other technology. *Clarification 2*: Instruction includes determining whether the transformed scatterplot has an appropriate line of best fit, and interpreting the y-intercept and slope of the line of best fit.

	Clarification 3: Problems include making a prediction or extrapolation, inside and outside the range of the data, based on the equation of the line of fit.
MA.912.DP.3.1:	Construct a two-way frequency table summarizing bivariate categorical data. Interpret joint and marginal frequencies and determine possible associations in terms of a real-world context.
MA.912.DP.3.2:	Given marginal and conditional relative frequencies, construct a two-way relative frequency table summarizing categorical bivariate data. **Clarifications:** *Clarification 1:* Construction includes cases where not all frequencies are given but enough are provided to be able to construct a two-way relative frequency table. *Clarification 2:* Instruction includes the use of a tree diagram when calculating relative frequencies to construct tables.
MA.912.DP.3.3:	Given a two-way relative frequency table or segmented bar graph summarizing categorical bivariate data, interpret joint, marginal and conditional relative frequencies in terms of a real-world context. **Clarifications:** *Clarification 1:* Instruction includes problems involving false positive and false negatives.
MA.912.DP.3.4:	Given a relative frequency table, construct and interpret a segmented bar graph.
MA.912.DP.3.5:	Solve real-world problems involving univariate and bivariate categorical data. **Clarifications:** *Clarification 1:* Instruction focuses on the connection to probability. *Clarification 2:* Instruction includes calculating joint relative frequencies or conditional relative frequencies using tree diagrams. Clarification 3: Graphical representations include frequency tables, relative frequency tables, circle graphs and segmented bar graphs.
MA.912.DP.4.1:	Describe events as subsets of a sample space using characteristics, or categories, of the outcomes, or as unions, intersections or complements of other events.
MA.912.DP.4.2:	Determine if events A and B are independent by calculating the product of their probabilities.
MA.912.DP.4.3:	Calculate the conditional probability of two events and interpret the result in terms of its context.
MA.912.DP.4.4:	Interpret the independence of two events using conditional probability.
MA.912.DP.4.5:	Given a two-way table containing data from a population, interpret the joint and marginal relative frequencies as empirical probabilities and the conditional relative frequencies as empirical conditional probabilities. Use those probabilities to determine whether characteristics in the population are approximately independent. **Clarifications:** *Clarification 1*: Instruction includes the connection between mathematical probability and applied statistics.
MA.912.DP.4.6:	Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.
MA.912.DP.4.7:	Apply the addition rule for probability, taking into consideration whether the events are mutually exclusive, and interpret the result in terms of the model and its context.
MA.912.DP.4.8:	Apply the general multiplication rule for probability, taking into consideration whether the events are independent, and interpret the result in terms of the context.
MA.912.DP.4.9:	Apply the addition and multiplication rules for counting to solve mathematical and real-world problems, including problems involving probability.
MA.912.DP.4.10:	Given a mathematical or real-world situation, calculate the appropriate permutation or combination.
MA.912.DP.5.1:	Distinguish between a population parameter and a sample statistic.
MA.912.DP.5.2:	Explain how random sampling produces data that is representative of a population.
MA.912.DP.5.3:	Compare and contrast sampling methods. **Clarifications:** *Clarification 1*: Instruction includes understanding the connection between probability and sampling methods. *Clarification 2*: Sampling methods include simple random, stratified, cluster, systematic, judgement, quota and convenience.
MA.912.DP.5.4:	Generate multiple samples or simulated samples of the same size to measure the variation in estimates or predictions.
MA.912.DP.5.5:	Determine if a specific model is consistent within a given process by analyzing the data distribution from a data-generating process.
MA.912.DP.5.6:	Determine the appropriate design, survey, experiment or observational study, based on the purpose. Articulate the types of questions appropriate for each type of design.
MA.912.DP.5.7:	Compare and contrast surveys, experiments and observational studies. **Clarifications:** *Clarification 1*: Instruction includes understanding how randomization relates to sample surveys, experiments and observational studies.
MA.912.DP.5.8:	Draw inferences about two populations using data and statistical analysis from two random samples.
MA.912.DP.5.9:	Compare two treatments using data from an experiment in which the treatments are assigned randomly. **Clarifications:** *Clarification 1*: Instruction includes the understanding that if one wants to validate a causal relationship, then randomized assignment of treatment groups must occur.
MA.912.DP.5.10:	Determine whether differences between parameters are significant using simulations.
MA.912.DP.5.11:	Evaluate reports based on data from diverse media, print and digital resources by interpreting graphs and tables; evaluating data-based arguments; determining whether a valid sampling method was used; or interpreting provided statistics. **Clarifications:** *Clarification 1*: Instruction includes determining whether or not data displays could be misleading.
MA.912.DP.6.1:	Define a random variable for a quantity of interest by assigning a numerical value to each individual outcome in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions.
MA.912.DP.6.2:	Develop a probability distribution for a discrete random variable using theoretical probabilities. Find the expected value and interpret it as the mean of the discrete distribution.
MA.912.DP.6.3:	Develop a probability distribution for a discrete random variable using empirical probabilities. Find the expected value and interpret it as the mean of the discrete distribution.
	Given a binomial distribution, calculate and interpret the expected value. Solve real-world problems involving binomial distributions.

MA.912.DP.6.4:	**Clarifications:** *Clarification 1*: Instruction focuses on the connection between binomial distributions and coin tossing and the connection to one-question surveys in which the question has two possible responses.
MA.912.DP.6.5:	Solve real-world problems involving geometric distributions. **Clarifications:** *Clarification 1*: Instruction focuses on the connection between geometric distributions and tossing a coin until the first heads appears and the connection to making repeated attempts at a task until it is successfully completed.
MA.912.DP.6.7:	Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values and standard deviations. Evaluate and compare strategies on the basis of the calculated expected values and standard deviations. **Clarifications:** *Clarification 1*: Instruction includes the relationship between expected values and standard deviations on one hand and the rewards and risks on the other hand. *Clarification 2*: Instruction includes reducing risk through diversification.
MA.912.DP.6.8:	Apply probabilities to make fair decisions, such as drawing from lots or using a random number generator.
MA.K12.MTR.1.1:	Mathematicians who participate in effortful learning both individually and with others: • Analyze the problem in a way that makes sense given the task. • Ask questions that will help with solving the task. • Build perseverance by modifying methods as needed while solving a challenging task. • Stay engaged and maintain a positive mindset when working to solve tasks. • Help and support each other when attempting a new method or approach. **Clarifications:** Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students’ ability to analyze and problem solve. • Recognize students’ effort when solving challenging problems.
MA.K12.MTR.2.1:	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: • Build understanding through modeling and using manipulatives. • Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. • Progress from modeling problems with objects and drawings to using algorithms and equations. • Express connections between concepts and representations. • Choose a representation based on the given context or purpose. **Clarifications:** Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations. **Clarifications:** Teachers who encourage students to complete tasks with mathematical fluency: • Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. • Offer multiple opportunities for students to practice efficient and generalizable methods. • Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
MA.K12.MTR.4.1:	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: • Communicate mathematical ideas, vocabulary and methods effectively. • Analyze the mathematical thinking of others. • Compare the efficiency of a method to those expressed by others. • Recognize errors and suggest how to correctly solve the task. • Justify results by explaining methods and processes. • Construct possible arguments based on evidence. **Clarifications:** Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students’ ability to justify methods and compare their responses to the responses of their peers.

MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. **Clarifications:** Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. **Clarifications:** Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems. • Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. **Clarifications:** Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. **Clarifications:** K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. **Clarifications:** See Text Complexity for grade-level complexity bands and a text complexity rubric.
ELA.K12.EE.3.1:	Make inferences to support comprehension. **Clarifications:** Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like "Why is the girl smiling?" or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. **Clarifications:** In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: "I think _______ because ______." The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.

ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. **Clarifications:** Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. **Clarifications:** In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

General Course Information and Notes

VERSION DESCRIPTION

In Probability and Statistics Honors, instructional time will emphasize four areas: (1) creating and interpreting data displays for univariate and bivariate categorical and numerical data; (2) comparing and making observations about populations using statistical data, including confidence intervals and hypothesis testing; (3) extending understanding of probability and probability distributions and (4) developing an understanding of methods for collecting statistical data, including randomized trials.

All clarifications stated, whether general or specific to Probability and Statistics Honors, are expectations for instruction of that benchmark.

Curricular content for all subjects must integrate critical-thinking, problem-solving, and workforce-literacy skills; communication, reading, and writing skills; mathematics skills; collaboration skills; contextual and applied-learning skills; technology-literacy skills; information and media-literacy skills; and civic-engagement skills.

GENERAL NOTES

Honors and Accelerated Level Course Note: Accelerated courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

Florida's Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards

This course includes Florida's B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Number: 1210300

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Probablility and Statistics >

Abbreviated Title: PROB & STATS HONORS

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- Honors
- Class Size Core Required

Course Type: Core Academic Course

Course Level: 3

Course Status: State Board Approved

Graduation Requirement: Mathematics

Educator Certifications

Mathematics (Grades 6-12)

Equivalent Courses

1210320-Advanced Placement Statistics
1210330-Cambridge AICE Mathematics Statistics AS Level

Mathematics for College Statistics (#1210305) 2022 - And Beyond (current)

Course Standards

Name	Description
MA.912.AR.1.1:	Identify and interpret parts of an equation or expression that represent a quantity in terms of a mathematical or real-world context, including viewing one or more of its parts as a single entity. **Clarifications:** *Clarification 1:* Parts of an expression include factors, terms, constants, coefficients and variables. *Clarification 2:* Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.1.2:	Rearrange equations or formulas to isolate a quantity of interest. **Clarifications:** *Clarification 1*: Instruction includes using formulas for temperature, perimeter, area and volume; using equations for linear (standard, slope-intercept and point-slope forms) and quadratic (standard, factored and vertex forms) functions. *Clarification 2*: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.2.5:	Solve and graph mathematical and real-world problems that are modeled with linear functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain, range, intercepts and rate of change. *Clarification 2*: Instruction includes the use of standard form, slope-intercept form and point-slope form. *Clarification 3*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation. *Clarification 4*: Within the Algebra 1 course, notations for domain, range and constraints are limited to inequality and set-builder. *Clarification 5*: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.AR.5.7:	Solve and graph mathematical and real-world problems that are modeled with exponential functions. Interpret key features and determine constraints in terms of the context. **Clarifications:** *Clarification 1*: Key features are limited to domain; range; intercepts; intervals where the function is increasing, decreasing, positive or negative; constant percent rate of change; end behavior and asymptotes. *Clarification 2*: Instruction includes representing the domain, range and constraints with inequality notation, interval notation or set-builder notation. *Clarification 3*: Instruction includes understanding that when the logarithm of the dependent variable is taken and graphed, the exponential function will be transformed into a linear function. *Clarification 4*: Within the Mathematics for Data and Financial Literacy course, problem types focus on money and business.
MA.912.DP.1.1:	Given a set of data, select an appropriate method to represent the data, depending on whether it is numerical or categorical data and on whether it is univariate or bivariate. **Clarifications:** *Clarification 1:* Instruction includes discussions regarding the strengths and weaknesses of each data display. *Clarification 2:* Numerical univariate includes histograms, stem-and-leaf plots, box plots and line plots; numerical bivariate includes scatter plots and line graphs; categorical univariate includes bar charts, circle graphs, line plots, frequency tables and relative frequency tables; and categorical bivariate includes segmented bar charts, joint frequency tables and joint relative frequency tables. *Clarification 3:* Instruction includes the use of appropriate units and labels and, where appropriate, using technology to create data displays.
MA.912.DP.1.2:	Interpret data distributions represented in various ways. State whether the data is numerical or categorical, whether it is univariate or bivariate and interpret the different components and quantities in the display. **Clarifications:** *Clarification 1*: Within the Probability and Statistics course, instruction includes the use of spreadsheets and technology.
MA.912.DP.1.3:	Explain the difference between correlation and causation in the contexts of both numerical and categorical data.
MA.912.DP.2.1:	For two or more sets of numerical univariate data, calculate and compare the appropriate measures of center and measures of variability, accounting for possible effects of outliers. Interpret any notable features of the shape of the data distribution. **Clarifications:** *Clarification 1*: The measure of center is limited to mean and median. The measure of variation is limited to range, interquartile range, and standard deviation. *Clarification 2*: Shape features include symmetry or skewness and clustering. *Clarification 3*: Within the Probability and Statistics course, instruction includes the use of spreadsheets and technology.

MA.912.DP.2.4:	Fit a linear function to bivariate numerical data that suggests a linear association and interpret the slope and y-intercept of the model. Use the model to solve real-world problems in terms of the context of the data. **Clarifications:** *Clarification 1*: Instruction includes fitting a linear function both informally and formally with the use of technology. *Clarification 2*: Problems include making a prediction or extrapolation, inside and outside the range of the data, based on the equation of the line of fit.
MA.912.DP.2.5:	Given a scatter plot that represents bivariate numerical data, assess the fit of a given linear function by plotting and analyzing residuals. **Clarifications:** *Clarification 1*: Within the Algebra 1 course, instruction includes determining the number of positive and negative residuals; the largest and smallest residuals; and the connection between outliers in the data set and the corresponding residuals.
MA.912.DP.2.6:	Given a scatter plot with a line of fit and residuals, determine the strength and direction of the correlation. Interpret strength and direction within a real-world context. **Clarifications:** *Clarification 1*: Instruction focuses on determining the direction by analyzing the slope and informally determining the strength by analyzing the residuals.
MA.912.DP.2.7:	Compute the correlation coefficient of a linear model using technology. Interpret the strength and direction of the correlation coefficient.
MA.912.DP.2.9:	Fit an exponential function to bivariate numerical data that suggests an exponential association. Use the model to solve real-world problems in terms of the context of the data. **Clarifications:** *Clarification 1*: Instruction focuses on determining whether an exponential model is appropriate by taking the logarithm of the dependent variable using spreadsheets and other technology. *Clarification 2*: Instruction includes determining whether the transformed scatterplot has an appropriate line of best fit, and interpreting the y-intercept and slope of the line of best fit. *Clarification 3*: Problems include making a prediction or extrapolation, inside and outside the range of the data, based on the equation of the line of fit.
MA.912.DP.3.1:	Construct a two-way frequency table summarizing bivariate categorical data. Interpret joint and marginal frequencies and determine possible associations in terms of a real-world context.
MA.912.DP.3.2:	Given marginal and conditional relative frequencies, construct a two-way relative frequency table summarizing categorical bivariate data. **Clarifications:** *Clarification 1:* Construction includes cases where not all frequencies are given but enough are provided to be able to construct a two-way relative frequency table. *Clarification 2:* Instruction includes the use of a tree diagram when calculating relative frequencies to construct tables.
MA.912.DP.3.5:	Solve real-world problems involving univariate and bivariate categorical data. **Clarifications:** *Clarification 1:* Instruction focuses on the connection to probability. *Clarification 2:* Instruction includes calculating joint relative frequencies or conditional relative frequencies using tree diagrams. Clarification 3: Graphical representations include frequency tables, relative frequency tables, circle graphs and segmented bar graphs.
MA.912.DP.4.1:	Describe events as subsets of a sample space using characteristics, or categories, of the outcomes, or as unions, intersections or complements of other events.
MA.912.DP.4.2:	Determine if events A and B are independent by calculating the product of their probabilities.
MA.912.DP.4.3:	Calculate the conditional probability of two events and interpret the result in terms of its context.
MA.912.DP.4.4:	Interpret the independence of two events using conditional probability.
MA.912.DP.4.5:	Given a two-way table containing data from a population, interpret the joint and marginal relative frequencies as empirical probabilities and the conditional relative frequencies as empirical conditional probabilities. Use those probabilities to determine whether characteristics in the population are approximately independent. **Clarifications:** *Clarification 1*: Instruction includes the connection between mathematical probability and applied statistics.
MA.912.DP.4.6:	Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.
MA.912.DP.4.7:	Apply the addition rule for probability, taking into consideration whether the events are mutually exclusive, and interpret the result in terms of the model and its context.
MA.912.DP.4.8:	Apply the general multiplication rule for probability, taking into consideration whether the events are independent, and interpret the result in terms of the context.
MA.912.DP.4.9:	Apply the addition and multiplication rules for counting to solve mathematical and real-world problems, including problems involving probability.
MA.912.DP.4.10:	Given a mathematical or real-world situation, calculate the appropriate permutation or combination.
MA.912.DP.5.1:	Distinguish between a population parameter and a sample statistic.
MA.912.DP.5.2:	Explain how random sampling produces data that is representative of a population.
MA.912.DP.5.3:	Compare and contrast sampling methods. **Clarifications:** *Clarification 1*: Instruction includes understanding the connection between probability and sampling methods. *Clarification 2*: Sampling methods include simple random, stratified, cluster, systematic, judgement, quota and convenience.
MA.912.DP.5.4:	Generate multiple samples or simulated samples of the same size to measure the variation in estimates or predictions.
MA.912.DP.5.5:	Determine if a specific model is consistent within a given process by analyzing the data distribution from a data-generating process.
MA.912.DP.5.6:	Determine the appropriate design, survey, experiment or observational study, based on the purpose. Articulate the types of questions appropriate for each type of design.
	Compare and contrast surveys, experiments and observational studies.

MA.912.DP.5.7:	**Clarifications:** *Clarification 1*: Instruction includes understanding how randomization relates to sample surveys, experiments and observational studies.
MA.912.DP.5.11:	Evaluate reports based on data from diverse media, print and digital resources by interpreting graphs and tables; evaluating data-based arguments; determining whether a valid sampling method was used; or interpreting provided statistics. **Clarifications:** *Clarification 1*: Instruction includes determining whether or not data displays could be misleading.
MA.912.F.1.2:	Given a function represented in function notation, evaluate the function for an input in its domain. For a real-world context, interpret the output. **Clarifications:** *Clarification 1*: Problems include simple functions in two-variables, such as f(x,y)=3x-2y. *Clarification 2*: Within the Algebra 1 course, functions are limited to one-variable such as f(x)=3x.
MA.912.F.1.8:	Determine whether a linear, quadratic or exponential function best models a given real-world situation. **Clarifications:** *Clarification 1*: Instruction includes recognizing that linear functions model situations in which a quantity changes by a constant amount per unit interval; that quadratic functions model situations in which a quantity increases to a maximum, then begins to decrease or a quantity decreases to a minimum, then begins to increase; and that exponential functions model situations in which a quantity grows or decays by a constant percent per unit interval. *Clarification 2*: Within this benchmark, the expectation is to identify the type of function from a written description or table.
MA.912.FL.1.1:	Extend previous knowledge of operations of fractions, percentages and decimals to solve real-world problems involving money and business. **Clarifications:** *Clarification 1*: Problems include discounts, markups, simple interest, tax, tips, fees, percent increase, percent decrease and percent error.
MA.912.FL.1.3:	Solve real-world problems involving weighted averages using spreadsheets and other technology.
MA.912.LT.5.4:	Perform the set operations of taking the complement of a set and the union, intersection, difference and product of two sets. **Clarifications:** *Clarification 1*: Instruction includes the connection to probability and the words AND, OR and NOT.
MA.912.LT.5.5:	Explore relationships and patterns and make arguments about relationships between sets using Venn Diagrams.
MA.K12.MTR.1.1:	Mathematicians who participate in effortful learning both individually and with others: • Analyze the problem in a way that makes sense given the task. • Ask questions that will help with solving the task. • Build perseverance by modifying methods as needed while solving a challenging task. • Stay engaged and maintain a positive mindset when working to solve tasks. • Help and support each other when attempting a new method or approach. **Clarifications:** Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: • Build understanding through modeling and using manipulatives. • Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. • Progress from modeling problems with objects and drawings to using algorithms and equations. • Express connections between concepts and representations. • Choose a representation based on the given context or purpose. **Clarifications:** Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations. **Clarifications:** Teachers who encourage students to complete tasks with mathematical fluency: • Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. • Offer multiple opportunities for students to practice efficient and generalizable methods. • Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:

MA.K12.MTR.4.1:	• Communicate mathematical ideas, vocabulary and methods effectively. • Analyze the mathematical thinking of others. • Compare the efficiency of a method to those expressed by others. • Recognize errors and suggest how to correctly solve the task. • Justify results by explaining methods and processes. • Construct possible arguments based on evidence. **Clarifications:** Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. **Clarifications:** Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. **Clarifications:** Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems. • Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. **Clarifications:** Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. **Clarifications:** K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. **Clarifications:** See Text Complexity for grade-level complexity bands and a text complexity rubric.

ELA.K12.EE.3.1:	Make inferences to support comprehension. **Clarifications:** Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like “Why is the girl smiling?” or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. **Clarifications:** In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: “I think _______ because ______.” The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. **Clarifications:** Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. **Clarifications:** In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

General Course Information and Notes

VERSION DESCRIPTION

In Mathematics for College Statistics, instructional time will emphasize four areas: (1) analyzing and applying linear and exponential functions within the context of statistics; (2) extending understanding of probability using data and various representations, including two-way tables and Venn Diagrams; (3) representing and interpreting univariate and bivariate categorical and numerical data and (4) determining the appropriateness of different types of statistical studies.

All clarifications stated, whether general or specific to Mathematics for College Statistics, are expectations for instruction of that benchmark.

Curricular content for all subjects must integrate critical-thinking, problem-solving, and workforce-literacy skills; communication, reading, and writing skills; mathematics skills; collaboration skills; contextual and applied-learning skills; technology-literacy skills; information and media-literacy skills; and civic-engagement skills.

GENERAL NOTES

Florida’s Benchmarks for Excellent Student Thinking (B.E.S.T.) Standards
This course includes Florida’s B.E.S.T. ELA Expectations (EE) and Mathematical Thinking and Reasoning Standards (MTRs) for students. Florida educators should intentionally embed these standards within the content and their instruction as applicable. For guidance on the implementation of the EEs and MTRs, please visit https://www.cpalms.org/Standards/BEST_Standards.aspx and select the appropriate B.E.S.T. Standards package.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL’s need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Number: 1210305

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Probablility and Statistics >

Abbreviated Title: MATH FOR COLL STATS

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- Class Size Core Required

Course Type: Core Academic Course

Course Level: 2

Course Status: State Board Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Mathematics

Educator Certifications

Mathematics (Grades 6-12)

Advanced Placement Statistics (#1210320) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

The course description for this Advanced Placement courses is located on the College Board site at http://apcentral.collegeboard.com/apc/public/courses/teachers_corner/index.html.

GENERAL INFORMATION

Course Number: 1210320

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Probablility and Statistics >

Abbreviated Title: AP STAT

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- Advanced Placement (AP)

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Mathematics

Educator Certifications

Mathematics (Grades 6-12)

Equivalent Courses

1210300-Probability and Statistics Honors
1210330-Cambridge AICE Mathematics Statistics AS Level

Cambridge AICE Mathematics Statistics AS Level (#1210330) 2014 - And Beyond (current)

General Course Information and Notes

GENERAL NOTES

For more information about this Cambridge course, visit http://www.cie.org.uk/programmes-and-qualifications/cambridge-advanced/cambridge-international-as-and-a-levels/curriculum/.

GENERAL INFORMATION

Course Number: 1210330

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Probablility and Statistics >

Abbreviated Title: AICE MATH STAT AS

Number of Credits: Half credit (.5)

Course Length: Semester (S)

Course Attributes:

- Advanced International Certificate of Education (AICE)

Course Type: Core Academic Course

Course Level: 3

Course Status: Course Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Mathematics

Educator Certifications

Mathematics (Grades 6-12)

Equivalent Courses

1210300-Probability and Statistics Honors
1210320-Advanced Placement Statistics

Discrete Mathematics Honors (#1212300) 2022 - And Beyond (current)

Course Standards

Name	Description
MA.912.AR.9.6:	Given a real-world context, represent constraints as systems of linear equations or inequalities. Interpret solutions to problems as viable or non-viable options. **Clarifications:** *Clarification 1*: Instruction focuses on analyzing a given function that models a real-world situation and writing constraints that are represented as linear equations or linear inequalities.
MA.912.AR.9.8:	Solve real-world problems involving linear programming in two variables.
MA.912.AR.10.1:	Given a mathematical or real-world context, write and solve problems involving arithmetic sequences.
MA.912.AR.10.2:	Given a mathematical or real-world context, write and solve problems involving geometric sequences.
MA.912.AR.10.5:	Given a mathematical or real-world context, write a sequence using function notation, defined explicitly or recursively, to represent relationships between quantities from a written description.
MA.912.AR.10.6:	Given a mathematical or real-world context, find the domain of a given sequence defined recursively or explicitly.
MA.912.DP.4.1:	Describe events as subsets of a sample space using characteristics, or categories, of the outcomes, or as unions, intersections or complements of other events.
MA.912.DP.4.9:	Apply the addition and multiplication rules for counting to solve mathematical and real-world problems, including problems involving probability.
MA.912.DP.4.10:	Given a mathematical or real-world situation, calculate the appropriate permutation or combination.
MA.912.GR.2.4:	Determine symmetries of reflection, symmetries of rotation and symmetries of translation of a geometric figure. **Clarifications:** *Clarification 1*: Instruction includes determining the order of each symmetry. *Clarification 2*: Instruction includes the connection between tessellations of the plane and symmetries of translations.
MA.912.LT.1.1:	Apply recursive and iterative thinking to solve problems.
MA.912.LT.1.2:	Solve problems involving recurrence relations. **Clarifications:** *Clarification 1*: Instruction includes finding explicit or recursive equations for recursively defined sequences. *Clarification 2*: Problems include fractals, the Fibonacci sequence, growth models and finite difference.
MA.912.LT.2.1:	Define and explain the basic concepts of Graph Theory. **Clarifications:** *Clarification 1*: Basic concepts include vertex, edge, directed edge, undirected edge, path, vertex degree, directed graph, undirected graph, tree, bipartite graph, circuit, connectedness and planarity.
MA.912.LT.2.2:	Solve problems involving paths in graphs. **Clarifications:** *Clarification 1*: Instruction includes simple paths and circuits; Hamiltonian paths and circuits; and Eulerian paths and circuits.
MA.912.LT.2.3:	Solve scheduling problems using critical path analysis and Gantt charts. Create a schedule using critical path analysis.
MA.912.LT.2.4:	Apply graph coloring techniques to solve problems. **Clarifications:** *Clarification 1*: Problems include map coloring and committee assignments.
MA.912.LT.2.5:	Apply spanning trees, rooted trees, binary trees and decision trees to solve problems. **Clarifications:** *Clarification 1*: Instruction includes the use of technology to determine the number of possible solutions and generating solutions when a feasible number of possible solutions exists.
MA.912.LT.3.1:	Define and explain the basic concepts of Election Theory and voting. **Clarifications:** *Clarification 1*: Basic concepts include approval and preference voting, plurality, majority, runoff, sequential runoff, Borda count, Condorcet and other fairness criteria, dummy voters and coalition.
MA.912.LT.3.2:	Analyze election data using election theory techniques. Explain how Arrow's Impossibility Theorem may be related to the fairness of the outcome of the election.
MA.912.LT.3.3:	Decide voting power within a group using weighted voting techniques. Provide real-world examples of weighted voting and its pros and cons.
MA.912.LT.3.4:	Solve problems using fair division and apportionment techniques. **Clarifications:** *Clarification 1*: Problems include fair division among people with different preferences, fairly dividing an inheritance that includes indivisible goods, salary caps in sports and allocation of representatives to Congress.
MA.912.LT.4.1:	Translate propositional statements into logical arguments using propositional variables and logical connectives.
MA.912.LT.4.2:	Determine truth values of simple and compound statements using truth tables.
	Identify and accurately interpret "if...then," "if and only if," "all" and "not" statements. Find the converse, inverse and contrapositive of a statement. **Clarifications:**

MA.912.LT.4.3:	*Clarification 1:* Instruction focuses on recognizing the relationships between an "if…then" statement and the converse, inverse and contrapositive of that statement. *Clarification 2:* Within the Geometry course, instruction focuses on the connection to proofs within the course.
MA.912.LT.4.4:	Represent logic operations, such as AND, OR, NOT, NOR, and XOR, using logical symbolism to solve problems.
MA.912.LT.4.5:	Determine whether two propositions are logically equivalent.
MA.912.LT.4.6:	Apply methods of direct and indirect proof and determine whether a logical argument is valid.
MA.912.LT.4.7:	Identify and give examples of undefined terms; axioms; theorems; proofs, including proofs using mathematical induction; and inductive and deductive reasoning.
MA.912.LT.4.8:	Construct proofs, including proofs by contradiction. **Clarifications:** *Clarification 1*: Within the Geometry course, proofs are limited to geometric statements within the course.
MA.912.LT.4.9:	Construct logical arguments using laws of detachment, syllogism, tautology, contradiction and Euler Diagrams.
MA.912.LT.4.10:	Judge the validity of arguments and give counterexamples to disprove statements. **Clarifications:** *Clarification 1:* Within the Geometry course, instruction focuses on the connection to proofs within the course.
MA.912.LT.5.1:	Given two sets, determine whether the two sets are equivalent and whether one set is a subset of another. Given one set, determine its power set.
MA.912.LT.5.2:	Given a relation on two sets, determine whether the relation is a function, determine the inverse of the relation if it exists and identify if the relation is bijective.
MA.912.LT.5.3:	Partition a set into disjoint subsets and determine an equivalence class given the equivalence relation on a set.
MA.912.LT.5.4:	Perform the set operations of taking the complement of a set and the union, intersection, difference and product of two sets. **Clarifications:** *Clarification 1*: Instruction includes the connection to probability and the words AND, OR and NOT.
MA.912.LT.5.5:	Explore relationships and patterns and make arguments about relationships between sets using Venn Diagrams.
MA.912.LT.5.6:	Prove set relations, including DeMorgan's Laws and equivalence relations.
MA.K12.MTR.1.1:	Mathematicians who participate in effortful learning both individually and with others: • Analyze the problem in a way that makes sense given the task. • Ask questions that will help with solving the task. • Build perseverance by modifying methods as needed while solving a challenging task. • Stay engaged and maintain a positive mindset when working to solve tasks. • Help and support each other when attempting a new method or approach. **Clarifications:** Teachers who encourage students to participate actively in effortful learning both individually and with others: • Cultivate a community of growth mindset learners. • Foster perseverance in students by choosing tasks that are challenging. • Develop students' ability to analyze and problem solve. • Recognize students' effort when solving challenging problems.
MA.K12.MTR.2.1:	Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways: • Build understanding through modeling and using manipulatives. • Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations. • Progress from modeling problems with objects and drawings to using algorithms and equations. • Express connections between concepts and representations. • Choose a representation based on the given context or purpose. **Clarifications:** Teachers who encourage students to demonstrate understanding by representing problems in multiple ways: • Help students make connections between concepts and representations. • Provide opportunities for students to use manipulatives when investigating concepts. • Guide students from concrete to pictorial to abstract representations as understanding progresses. • Show students that various representations can have different purposes and can be useful in different situations.
MA.K12.MTR.3.1:	Complete tasks with mathematical fluency. Mathematicians who complete tasks with mathematical fluency: • Select efficient and appropriate methods for solving problems within the given context. • Maintain flexibility and accuracy while performing procedures and mental calculations. • Complete tasks accurately and with confidence. • Adapt procedures to apply them to a new context. • Use feedback to improve efficiency when performing calculations. **Clarifications:** Teachers who encourage students to complete tasks with mathematical fluency: • Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately. • Offer multiple opportunities for students to practice efficient and generalizable methods. • Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.
	Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others: • Communicate mathematical ideas, vocabulary and methods effectively. • Analyze the mathematical thinking of others.

MA.K12.MTR.4.1:	• Compare the efficiency of a method to those expressed by others. • Recognize errors and suggest how to correctly solve the task. • Justify results by explaining methods and processes. • Construct possible arguments based on evidence. **Clarifications:** Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others: • Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning. • Create opportunities for students to discuss their thinking with peers. • Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods. • Develop students' ability to justify methods and compare their responses to the responses of their peers.
MA.K12.MTR.5.1:	Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts: • Focus on relevant details within a problem. • Create plans and procedures to logically order events, steps or ideas to solve problems. • Decompose a complex problem into manageable parts. • Relate previously learned concepts to new concepts. • Look for similarities among problems. • Connect solutions of problems to more complicated large-scale situations. **Clarifications:** Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts: • Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts. • Support students to develop generalizations based on the similarities found among problems. • Provide opportunities for students to create plans and procedures to solve problems. • Develop students' ability to construct relationships between their current understanding and more sophisticated ways of thinking.
MA.K12.MTR.6.1:	Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions: • Estimate to discover possible solutions. • Use benchmark quantities to determine if a solution makes sense. • Check calculations when solving problems. • Verify possible solutions by explaining the methods used. • Evaluate results based on the given context. **Clarifications:** Teachers who encourage students to assess the reasonableness of solutions: • Have students estimate or predict solutions prior to solving. • Prompt students to continually ask, "Does this solution make sense? How do you know?" • Reinforce that students check their work as they progress within and after a task. • Strengthen students' ability to verify solutions through justifications.
MA.K12.MTR.7.1:	Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts: • Connect mathematical concepts to everyday experiences. • Use models and methods to understand, represent and solve problems. • Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency. **Clarifications:** Teachers who encourage students to apply mathematics to real-world contexts: • Provide opportunities for students to create models, both concrete and abstract, and perform investigations. • Challenge students to question the accuracy of their models and methods. • Support students as they validate conclusions by comparing them to the given situation. • Indicate how various concepts can be applied to other disciplines.
ELA.K12.EE.1.1:	Cite evidence to explain and justify reasoning. **Clarifications:** K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing. 2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations. 4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they've directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor. 6-8 Students continue with previous skills and use a style guide to create a proper citation. 9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.
ELA.K12.EE.2.1:	Read and comprehend grade-level complex texts proficiently. **Clarifications:** See Text Complexity for grade-level complexity bands and a text complexity rubric.
	Make inferences to support comprehension.

ELA.K12.EE.3.1:	**Clarifications:** Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like “Why is the girl smiling?” or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.
ELA.K12.EE.4.1:	Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations. **Clarifications:** In kindergarten, students learn to listen to one another respectfully. In grades 1-2, students build upon these skills by justifying what they are thinking. For example: “I think _______ because ______.” The collaborative conversations are becoming academic conversations. In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.
ELA.K12.EE.5.1:	Use the accepted rules governing a specific format to create quality work. **Clarifications:** Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.
ELA.K12.EE.6.1:	Use appropriate voice and tone when speaking or writing. **Clarifications:** In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

General Course Information and Notes

VERSION DESCRIPTION

In Discrete Mathematics Honors, instructional time will emphasize five areas: (1) extending understanding of sequences and patterns to include Fibonacci sequences and tessellations; (2) applying probability and combinatorics; (3) extending understanding of systems of equations and inequalities to solve linear programming problems; (4) developing an understanding of Graph Theory, Election Theory and Set Theory and (5) developing an understanding of propositional logic, arguments and methods of proof.

All clarifications stated, whether general or specific to Discrete Mathematics Honors, are expectations for instruction of that benchmark.

Curricular content for all subjects must integrate critical-thinking, problem-solving, and workforce-literacy skills; communication, reading, and writing skills; mathematics skills; collaboration skills; contextual and applied-learning skills; technology-literacy skills; information and media-literacy skills; and civic-engagement skills.

GENERAL NOTES

Honors and Accelerated Level Course Note: Accelerated courses require a greater demand on students through increased academic rigor. Academic rigor is obtained through the application, analysis, evaluation, and creation of complex ideas that are often abstract and multi-faceted. Students are challenged to think and collaborate critically on the content they are learning. Honors level rigor will be achieved by increasing text complexity through text selection, focus on high-level qualitative measures, and complexity of task. Instruction will be structured to give students a deeper understanding of conceptual themes and organization within and across disciplines. Academic rigor is more than simply assigning to students a greater quantity of work.

English Language Development ELD Standards Special Notes Section:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate information, ideas and concepts for academic success in the content area of Mathematics. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL’s need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/eld/ma.pdf

GENERAL INFORMATION

Course Number: 1212300

Course Path: Section: Grades PreK to 12 Education Courses > **Grade Group:** Grades 9 to 12 and Adult Education Courses > **Subject:** Mathematics > **SubSubject:** Discrete Mathematics >

Abbreviated Title: DISCRETE MATH HONORS

Number of Credits: One (1) credit

Course Length: Year (Y)

Course Attributes:

- Honors
- Class Size Core Required

Course Type: Core Academic Course

Course Level: 3

Course Status: State Board Approved

Grade Level(s): 9,10,11,12

Graduation Requirement: Mathematics

Educator Certifications

Mathematics (Grades 6-12)