Algebra 1 Instructional Toolkit

The Algebra 1 Instructional Toolkit is intended to assist teachers with planning instruction aligned to the Florida Standards. This toolkit is not intended to replace your district's curriculum, but rather it serves to support the teaching and learning of the Algebra 1 Florida Standards. This toolkit includes a breakdown of information related to the Algebra 1 End-of-Course (EOC) Assessment, CPALMS and Florida Students, the Algebra 1 Florida Standards, and standards aligned resources.

Algebra 1 End-of-Course Assessment

This section highlights some key information related to the Algebra 1 EOC that can be found on the FSA Portal. These items include the Test Design Summary and Blueprint, Test Item Specifications and EOC Practice Tests.

Test Design Summary and Blueprint

The Algebra 1 EOC standards can be broken down into three major reporting categories as assessed on the Algebra 1 EOC with a corresponding weight. Within each reporting category are multiple domains and standards assessed. It is important to note that standards within the Number & Quantity: Quantities domain are assessed throughout the Algebra 1 EOC. This information can also be found on page 7 of the Test Design Summary and Blueprint.

- Algebra and Modeling (41%)
  - Arithmetic with Polynomials & Rational Expressions
  - Creating Equations
  - Reasoning with Equations and Inequalities
  - Seeing Structure in Expressions
- Functions and Modeling (40%)
  - Building Functions
  - Interpreting Functions
  - Linear, Quadratic, & Exponential Models
- Statistics & The Number System (19%)
  - The Real Number System
  - Interpreting Categorical & Quantitative Data

Test Item Specifications

The Algebra 1 Test Item Specification Document indicates the alignment of items with the Florida Standards. Assessment limits are included in the specifications, which define the range of content knowledge in the assessment items for the standard. In addition to limits, each item specification identifies whether or not that item could appear in the calculator allowed test session or no calculator allowed test session. Each standard in this toolkit lists the corresponding page number in the specifications document along with any assessment limits and allowable calculator use. Due to standards within the Number and Quantity domain assessed throughout the Algebra 1 EOC, there are no test item specifications for these standards.

Practice Tests

Practice Tests are available for students to become familiar with the various item types that may be used on the Algebra 1 EOC. Within the Test Item Specification document, page 44, is a chart aligning standards to each item type and item number on the Computer-Based Practice Test. Each Computer-Based Practice Test is provided with

an answer key. It is important to note that students are not permitted to use a calculator of any kind on Session 1 of the Algebra 1 EOC. Students will be permitted a scientific calculator on all other sessions. For information regarding usage of calculators, please see the Calculator and Reference Sheet Policy page on the FSA portal.

CPALMS: Official Source of Florida Standards

This section features information and tools that are found on CPALMS.

Algebra 1 Course Description
The Algebra 1 Course Description provides an overview for the course with standards aligned resources for educators, students, and parents.

Mathematics Formative Assessment System (MFAS)
One resource available on CPALMS that has been designed specifically for mathematics instruction is the Mathematics Formative Assessment System (MFAS). The system includes a task or problem that teachers can implement with their students. It also includes various levels of rubrics that help the teacher interpret students' responses. In addition to using the MFAS tasks as formative assessments for students, these tasks can be used by teachers to plan lessons that are closely aligned to the standards.

Model Eliciting Activity (MEAs)
Model Eliciting Activities (MEAs) are open-ended, interdisciplinary problem-solving activities that are meant to reveal students' thinking about the concepts embedded in these realistic activities. Students will work in teams to apply their knowledge of mathematics and science while considering constraints and tradeoffs. Each MEA is aligned to at least two subject areas, including mathematics, English language arts and/or literacy in the content areas, and science.

Mathematical Practices
The Mathematical Practices are habits of mind that describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. The Mathematical Practices should be infused during the course and will be assessed throughout the Algebra 1 EOC. More information about each Mathematical Practice can be found by clicking on the links below.

MAFS.K12.MP.1.1 Make sense of problems and persevere in solving them.

MAFS.K12.MP.2.1 Reason abstractly and quantitatively.

MAFS.K12.MP.3.1 Construct viable arguments and critique the reasoning of others.

MAFS.K12.MP.4.1 Model with mathematics.

MAFS.K12.MP.5.1 Use appropriate tools strategically.

MAFS.K12.MP.6.1 Attend to precision.

MAFS.K12.MP.7.1 Look for and make use of structure.

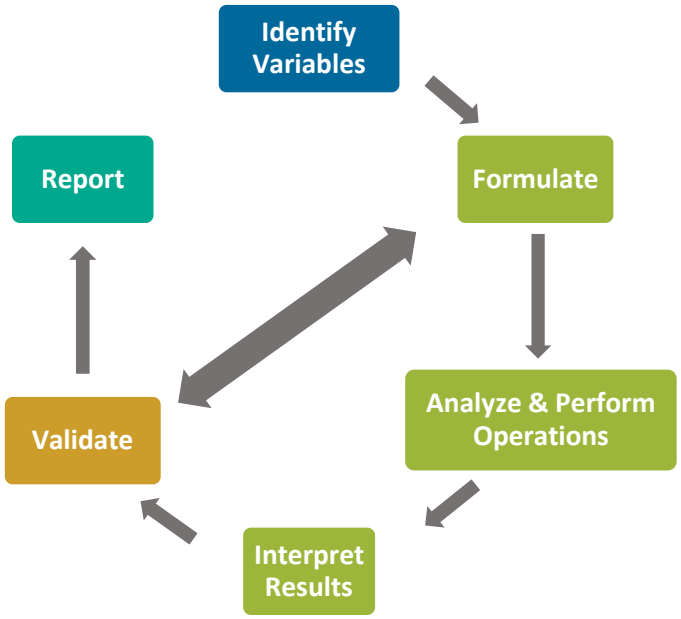
MAFS.K12.MP.8.1 Look for and express regularity in repeated reasoning.

Depth of Knowledge
Florida has adopted Webb's four-level Depth of Knowledge (DOK) model of content complexity as a means of classifying the cognitive demand presented by the Florida standards. It is important to distinguish between the DOK rating for a given standard and the possible DOK ratings for assessment items designed to address the standard. This is particularly important for assessment purposes, since 50% or more of assessment items associated with a given standard should meet or exceed the DOK level of the standard. The DOK Levels are

identified for each standard throughout this document. Please visit the CPALMS Content Complexity page for more information about the DOK complexity for standards. For more information about the DOK complexity for mathematics assessments, please visit page 9 of the mathematics Test Design Summary and Blueprint on the FSA Portal.

Math Modeling Standards

Standards that are marked with a star symbol (★) are standards within the math modeling conceptual category. Modeling standards are best interpreted in relation to other standards and within other content areas. The basic modeling cycle involves (1) identifying variables in the situation and selecting those that represent essential features, (2) formulating a model by creating and selecting geometric, graphical, tabular, algebraic, or statistical representations that describe relationships between the variables, (3) analyzing and performing operations on these relationships to draw conclusions, (4) interpreting the results of the mathematics in terms of the original situation, (5) validating the conclusions by comparing them with the situation, and then either improving the model or, if it is acceptable, (6) reporting on the conclusions and the reasoning behind them. Choices, assumptions, and approximations are present throughout this cycle. See figure below that visualizes the modeling cycle.



Florida Students

Resources specifically designed with students in mind are available on Florida Students. Florida Students is an interactive site that provides educational resources and student tutorials aligned to the Florida Standards. This site should not be used as a lesson guide, but rather a tool to help students obtain mastery in various mathematical concepts.

Florida Students Achieve

Resources specifically designed with parents in mind are available on Florida Students Achieve. This site provides parents with information on what their student should be learning at each grade level so that may support their child's education.

Algebra 1 Florida Standards

This section includes a breakdown of each standard by domain and cluster. Standards should not be taught in the order below. To do so would strip the coherence of the mathematical ideas and miss opportunity to enhance the major work of the grade with the supporting clusters and/or standards. In addition to the breakdown, each standard has the corresponding DOK Level, clarifications and assessment limits with page number in the Algebra 1 Test Item Specifications, and aligned resources.

Domain: Number & Quantity-Quantities

Cluster 1 *(Supporting): Reason quantitatively and use units to solve problems.*

Standard Code	Standard	Clarification(s) & Assessment Limit(s)	Resources
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. ★ Content Complexity: Level 2: Basic Application of Skills & Concepts	N/A Item assessed with and/or without calculator.	MFAS: Aquarium Visitors Problem-Solving Task: Weed Killer
MAFS.912.N-Q.1.2	Define appropriate quantities for the purpose of descriptive modeling. ★ Content Complexity: Level 2: Basic Application of Skills & Concepts	N/A Item assessed with and/or without calculator.	MFAS: Rain Damage Model Lesson: Testing water for drinking purposes
MAFS.912.N-Q.1.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★ Content Complexity: Level 2: Basic Application of Skills & Concepts	N/A Item assessed with and/or without calculator.	MFAS: Density Problem-Solving Task: Calories in a Sports Drink

Domain: Number & Quantity-The Real Number System

Cluster 1 (Major)*: Extend the properties of exponents to rational exponents.*

Standard Code	Standard	Clarification(s) & Assessment Limit(s)	Resources
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	Page 38; Students will use the properties of exponents to rewrite a radical expression as an expression with a rational exponent. Students will use the properties of exponents to rewrite an expression with a rational	MFAS: Rational Exponents and Roots

	exponents. *For example, we define* $5^{\frac{1}{3}}$ *to be the cube root of 5 because we want* $\left(5^{\frac{1}{3}}\right)^3 = 5^{(\frac{1}{3})3}$ *to hold, so* $\left(5^{\frac{1}{3}}\right)^3$ *must equal 5.* Content Complexity: Level 2: Basic Application of Skills & Concepts	exponent as a radical expression. Students will apply the properties of operations of integer exponents to expressions with rational exponents. Students will apply the properties of operations of integer exponents to radical expressions. Expressions should contain no more than three variables. Item assessed with and/or without calculator.	Problem-Solving Task: Extending the Definitions of Exponents
MAFS.912.N-RN.1.2	Rewrite expressions involving radicals and rational exponents using the properties of exponents. Content Complexity: Level 1: Recall	Page 38; Students will use the properties of exponents to rewrite a radical expression as an expression with a rational exponent. Students will use the properties of exponents to rewrite an expression with a rational exponent as a radical expression. Students will apply the properties of operations of integer exponents to expressions with rational exponents. Students will apply the properties of operations of integer exponents to radical expressions. Expressions should contain no more than three variables. Item assessed with and/or without calculator.	MFAS: Rational Exponents Lesson: Simply Radical!

Cluster 2 *(Additional): Use properties of rational and irrational numbers.*

Standard Code	Standard	Clarification(s) & Assessment Limit(s)	Resources
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. Content Complexity: Level 2: Basic Application of Skills & Concepts	Page 38; Students will write algebraic proofs that show that a 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. Expressions should contain no more than three variables. Item assessed with and/or without calculator.	MFAS: Product of Non-Zero rational and Irrational Numbers Problem-Solving Task: Operations with rational & Irrational Numbers

Domain: Algebra-Arithmetic with Polynomials & Rational Expressions

Cluster 1 *(Major): Perform arithmetic operations on polynomials.*

Standard Code	Standard	Clarification(s) & Assessment Limit(s)	Resources
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. Content Complexity: Level 1: Recall	Page 11; Items set in a real-world context should not result in a nonreal answer if the polynomial is used to solve for the unknown. In items that require addition and subtraction, polynomials are limited to monomials, binomials, and trinomials. The simplified polynomial should contain no more than six terms. Items requiring multiplication of polynomials are limited to a product of: two monomials, a monomial and a binomial, a monomial and a trinomial, two binomials, and a binomial and a trinomial. Item assessed with and/or without calculator.	MFAS: Multiplying Polynomials Lesson: Wonka's Golden Ticket!

Cluster 2 *(Supporting): Understand the relationship between zeros and factors of polynomials.*

Standard Code	Standard	Clarification(s) & Assessment Limit(s)	Resources
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. Content Complexity: Level 1: Recall	Pages 31-33; Students will find zeros of a polynomial function when the polynomial is in factored form. Students will create a rough graph of a polynomial function in factored form by examining the zeros of the function. Students will use the x-intercepts of a polynomial function and end behavior to graph the function. The leading coefficient should be an integer and the polynomial's degree is restricted to 3 or 4. The polynomial function should not have a zero with multiplicity. The polynomial should be given in factored form. Item assessed with and/or without calculator.	MFAS: Use Zeros to Graph Lesson: Representing Polynomials

Domain: Algebra-Creating Equations

Cluster 1 *(Major): Create equations that describe numbers or relationships.*

Standard Code	Standard	Clarification(s) & Assessment Limit(s)	Resources
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. ★ Content Complexity: Level 2: Basic Application of Skills & Concepts	Pages 12-13; Students will write an equation in one variable that represents a real-world context. Students will write an inequality in one variable that represents a real-world context. In items that require the student to write an equation, equations are limited to exponential functions with one translation, linear functions, or quadratic functions. Items may include equations or inequalities that contain variables on both sides. Items may include compound inequalities. In items that require the student to write an exponential function given ordered pairs, at least one pair of consecutive values must be given. In items that require the student to write or solve an inequality, variables are restricted to an exponent of one. Item assessed with and/or without calculator.	MFAS: State Fair Lesson: The Yo-Yo Problem
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. ★ Content Complexity: Level 2: Basic Application of Skills & Concepts	Pages 14-15; Students will identify the quantities in a real-world situation that should be represented by distinct variables. Students will write a system of equations given a real-world situation. Students will graph a system of equations that represents a real-world context using appropriate axis labels and scales. Items that require the student to write a system of equations using a real-world context are limited to a system of 2 x 2 linear equations. Item assessed with and/or without calculator.	MFAS: Tech Repairs Graph Problem-Solving Task: Cash Box
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*	Page 16; Students will write constraints for a real-world context using equations, inequalities, a system of equations, or a system of inequalities. Students will interpret the solution of a real-world context as	MAFS: Sugar and Protein Lesson: Feasible or Non-Feasible?

	describing nutritional and cost constraints on combinations of different foods. ★ Content Complexity: Level 3: Strategic Thinking & Complex Reasoning	viable or not viable. In items that require the student to write an equation as a constraint, the equation may be a linear function. In items that require the student to write a system of equations to represent a constraint, the system is limited to two variables. In items that require the student to write a system of inequalities to represent a constraint, the system is limited to two variables. Item assessed with and/or without calculator.	
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.* ★ Content Complexity: Level 1: Recall	Pages 12-13; Students will solve multi-variable formulas or literal equations for a specific variable. Students will solve formulas and equations with coefficients represented by letters. Items that involve formulas should not include overused contexts such as Fahrenheit/Celsius or three -dimensional geometry formulas. In items that require the student to solve literal equations and formulas, a linear term should be the term of interest. Items should not require more than four procedural steps to isolate the variable of interest. Items may require the student to recognize equivalent expressions. Item assessed with and/or without calculator.	MAFS: Rewriting Equations Lesson: Don't Take it so Literal

Domain: Algebra-Reasoning with Equations & Inequalities

Cluster 1 *(Major):* Understand solving equations as a process of reasoning and explain the reasoning.

Standard Code	Standard	Clarification(s) & Assessment Limit(s)	Resources
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.	Pages 17; Students will complete an algebraic proof of solving a linear equation. Students will construct a viable argument to justify a solution method. Items will not require the student to recall names of properties from memory. Item assessed with and/or without calculator.	MFAS: Equation Logic Original Tutorial: Justifiable Steps

	Content Complexity: Level 3: Strategic Thinking & Complex Reasoning		

Cluster 2 *(Major):* Solve equations and inequalities in one variable.

Standard Code	Standard	Clarification(s) & Assessment Limit(s)	Resources
MAFS.912.A-REI.2.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. Content Complexity: Level 2: Basic Application of Skills & Concepts	Page 12-13; Students will solve a linear equation. Students will solve a linear inequality. Items may include equations or inequalities that contain variables on both sides. Items may include compound inequalities. Item assessed with and/or without calculator.	MFAS: Solving Multistep Inequality Tutorial: Linear Inequalities
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. Content Complexity: Level 2: Basic Application of Skills & Concepts	Pages 18-19; Students will rewrite a quadratic equation in vertex form by completing the square. Students will use the vertex form of a quadratic equation to complete steps in the derivation of the quadratic formula. Students will solve a simple quadratic equation by inspection or by taking square roots. Students will solve a quadratic equation by choosing an appropriate method. Students will validate why taking the square root of both sides when solving a quadratic equation will yield two solutions. Students will recognize that the quadratic formula can be used to find complex solutions. Items may require the student to recognize that a solution is nonreal but should not require the student to find a nonreal solution. Item assessed with and/or without calculator.	MFAS: Which Strategy? Original Tutorial: Solving Quadratic Equations by Completing the square

Cluster 3 *(Additional):* Solve systems of equations.

Standard Code	Standard	Clarification(s) & Assessment Limit(s)	Resources
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	Pages 14-15; Students will provide steps in an algebraic proof that shows one equation being replaced with another to find a solution for a system of equations. Students will identify	MFAS: Solving Systems Lesson: Changes are

	produces a systems with the same solutions. Content Complexity: Level 3: Strategic Thinking & Complex Reasoning	systems whose solutions would be the same through examination of the coefficients. Item assessed with and/or without calculator.	Coming! But Does it Really Matter?
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. Content Complexity: Level 1: Recall	Pages 14-15; Students will graph a system of equations that represents a real-world context using appropriate axis labels and scale. Students will solve systems of linear equations. Items that require the student to solve a system of equations are limited to a system of 2 x 2 linear equations. Items that require the student to graph a system of equations or inequalities to find the solution are limited to a 2 x 2 system. Item assessed with and/or without calculator.	MFAS: Solving a System of Equations Lesson: Systems of Linear Round Tables

Cluster 4 *(Major):* Represent and solve equations and inequalities graphically.

Standard Code	Standard	Clarification(s) & Assessment Limit(s)	Resources
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). Content Complexity: Level 1: Recall	Pages 20-21; In items where a function is represented by an equation, the function may be an exponential function with no more than one translation, a linear function, or a quadratic function. In items where a function is represented by a graph or table, the function may be any continuous function. Item assessed with and/or without calculator.	MFAS: Case in Point Original Tutorial: Finding Solutions on a Graph
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,	Pages 20-21; Students will find a solution or an approximate solution for $f(x) = g(x)$ using a graph. Students will find a solution or an approximate solution for $f(x) = g(x)$ using a table of values. Students will find a solution or an approximate solution for $f(x) = g(x)$ using successive approximations that give the solution to a given place value. Students will justify why the intersection of two functions is a solution to $f(x) = g(x)$. Students will	MFAS: Using Tables Original Tutorial: Solving an Equation Using a Graph

	exponential, and logarithmic functions. ★ Content Complexity: Level 2: Basic Application of Skills & Concepts	verify if a set of ordered pairs is a solution of a function. Item assessed with and/or without calculator.	
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. Content Complexity: Level 2: Basic Application of Skills & Concepts	Pages 14-15; Students will identify the graph that represents a linear inequality. Students will graph a linear inequality. Students will identify the solution set to a system of inequalities. Students will identify ordered pairs that are in the solution set of a system of inequalities. Students will graph the solution set to a system of inequalities. Item assessed with and/or without calculator.	MFAS: Graph a System of Inequalities Lesson: Solving Systems of Inequalities

Domain: Algebra-Seeing Structure in Expressions

Cluster 1 *(Major):* Interpret the structure of expressions.

Standard Code	Standard	Clarification(s) & Assessment Limit(s)	Resources
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* $P(1+r)^n$ *as the product of P and a factor not depending on P.* Content Complexity: Level 2: Basic Application of Skills & Concepts	Pages 22-23; Students will use equivalent forms of an exponential expression to interpret the expression's terms, factors, coefficients, or parts in terms of the real-world situation the expression represents. Items should not ask the student to interpret zeros, the vertex, or axis of symmetry when the quadratic expression is in the form $ax^2 + bx + c$ (see F-IF.3.8). Exponential expressions are limited to simple growth and decay. If the number *e* is used then its approximate value should be given in the stem. Quadratic expressions should be univariate. Item assessed with and/or without calculator.	MFAS: Interpreting Basic Tax Lesson: Dissecting an Expression
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* $(x^2 - y^2)(x^2 + y^2)$.	Pages 22-23; Students will rewrite algebraic expressions in different equivalent forms by recognizing the expression's structure. Students will rewrite algebraic expressions in different equivalent forms using	MFAS: Quadratic Expressions Lesson: Using Algebra Tiles

	Content Complexity: Level 2: Basic Application of Skills & Concepts	factoring techniques or simplifying expressions. In items that require the student to write equivalent expressions by factoring, the given expression may have integral common factors, be a difference of two squares up to a degree of 4, be a quadratic, $ax^2 + bx + c$, where $a > 0$ and a, b, and c are integers, or be a polynomial of four terms with a leading coefficient of 1 and highest degree of 3. Item assessed with and/or without calculator.	

***Cluster 2** (Supporting):* Write expressions in equivalent forms to solve problems.

Standard Code	Standard	Clarification(s) & Assessment Limit(s)	Resources
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* $\left(1.15^{\frac{1}{12}}\right)^{12t} \approx (1.012)^{12t}$ *to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.* Content Complexity: Level 2: Basic Application of Skills & Concepts	Pages 22-23; Students will use equivalent forms of a quadratic expression to interpret the expression's terms, factors, zeros, maximum, minimum, coefficients, or parts in terms of the real-world situation the expression represents. In items that require the student to transform a quadratic equation to vertex form, b/a must be an even integer. Exponential expressions are limited to simple growth and decay. If the number e is used then its approximate value should be given in the stem. Quadratic expressions should be univariate. Items should only ask students to interpret the y-value of the vertex within a real-world context. Items should require the student to choose how to rewrite the expression. Item assessed with and/or without calculator.	MFAS: College Costs Original Tutorial: Finding the Zeros of Quadratic Functions

Domain: Functions-Building Functions

Cluster 1 *(Supporting): Build a function that models a relationship between two quantities.*

Standard Code	Standard	Clarification(s) & Assessment Limit(s)	Resources
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.* Content Complexity: Level 2: Basic Application of Skills & Concepts	Pages 35-36; Students will write an explicit function, define a recursive process, or complete a table of calculations that can be used to mathematically define a real-world context. Students will write a function that combines functions using arithmetic operations and relate the result to the context of the problem. Students will write a function to model a real-world context by composing functions and the information within the context. In items where the student must write a function using arithmetic operations or by composing functions, the student should have to generate the new function only. Item assessed with and/or without calculator.	Problem-Solving Task: Crude Oil and Gas Mileage MFAS: Furniture Purchase

Cluster 2 *(Additional): Build new functions from existing functions.*

Standard Code	Standard	Clarification(s) & Assessment Limit(s)	Resources
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.* Content Complexity: Level 3: Strategic Thinking & Complex Reasoning	Pages 24-25; Students will determine the value of *k* when given a graph of the function and its transformation. Students will identify differences and similarities between a function and its transformation. Students will identify a graph of a function given a graph or a table of a transformation and the type of transformation that is represented. Students will graph by applying a given transformation to a function. Students will identify ordered pairs of a transformed graph. Students will complete a table for a transformed function. Functions	Lesson: Functions, Graphs, and Symmetry… Oh My! MFAS: Comparing Functions – Quadratic

		represented algebraically are limited to linear, quadratic, or exponential. Functions represented using tables or graphs are not limited to linear, quadratic, or exponential. Functions may be represented using tables or graphs. Functions may have closed domains. Functions may be discontinuous. Items should have a single transformation. Item assessed with and/or without calculator.	

Domain: Functions-Interpreting Functions

Cluster 1 *(Major): Understand the concept of a function and use function notation.*

Standard Code	Standard	Clarification(s) & Assessment Limit(s)	Resources
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). Content Complexity: Level 1: Recall	Pages 26-27; Students will use the definition of a function to determine if a relationship is a function, given tables, graphs, mapping diagrams, or sets of ordered pairs. Items may present relations in a variety of formats, including sets of ordered pairs, mapping diagrams, graphs, and input/output models. Item assessed with and/or without calculator.	Lesson: Functions: Domain and Range MFAS: Identifying the Graphs of a Function
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. Content Complexity: Level 2: Basic Application of Skills & Concepts	Pages 26-27; Students will evaluate functions that model a real-world context for inputs in the domain. Students will interpret the domain of a function within the real-world context given. Students will interpret statements that use function notation within the real-world context given. Items that require the student to find a value given a function, the following function types are allowed: quadratic, polynomials whose degrees are no higher than 6, square root, cube root, absolute value, exponential except for base *e*, and simple rational. Item assessed with and/or without calculator.	MFAS: Cell Phone Battery Life

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. Content Complexity: Level 2: Basic Application of Skills & Concepts	Pages 35-36; Students will write a recursive definition for a sequence that is presented as a sequence, a graph, or a table. Item assessed with and/or without calculator.	MFAS: Recursive Sequences Text Resource: Patterns and Structure

Cluster 2 *(Major): Interpret functions that arise in applications in terms of the context.*

Standard Code	Standard	Clarification(s) & Assessment Limit(s)	Resources
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.* ★ Content Complexity: Level 2: Basic Application of Skills & Concepts	Pages 28-29; Students will determine and relate the key features of a function within a real-world context by examining the function's table. Students will determine and relate the key features of a function within a real-world context by examining the function's graph. Students will use a given verbal description of the relationship between two quantities to label key features of a graph of a function that model the relationship. Functions may be represented using tables, graphs or verbally. Functions represented using these representations are not limited to linear, quadratic or exponential. Functions may have closed domains. Functions may be discontinuous. Items may not require the student to use or know interval notation. Key features include x-intercepts, y-intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; and end behavior. Item assessed with and/or without calculator.	MFAS: Surf's Up Problem-Solving Task: Warming and Cooling
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*	Pages 26-27; Students will determine the feasible domain of a function that models a real-world context. Items may not require the student to use or know interval notation. In items requiring the student to find the	MFAS: Describe the Domain

	the positive integers would be an appropriate domain for the function. ★ Content Complexity: Level 2: Basic Application of Skills & Concepts	domain from graphs, relationships may be on a closed or open interval. In items requiring the student to find domain from graphs, relationships may be discontinuous. Item assessed with and/or without calculator.	
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. ★ Content Complexity: Level 2: Basic Application of Skills & Concepts	Page 30; Students will calculate the average rate of change of a continuous function that is represented algebraically, in a table of values, on a graph, or as a set of data. Students will interpret the average rate of change of a continuous function that is represented algebraically, in a table of values, on a graph, or as a set of data with a real-world context. Items requiring the student to calculate the rate of change will give a specified interval that is both continuous and differentiable. Items should not require the student to find an equation of a line. Item should not be linear. Item assessed with and/or without calculator.	MFAS: Air Cannon Original Tutorial: Changing Rates

Cluster 3 *(Supporting): Analyze functions using different representations.*

Standard Code	Standard	Clarification(s) & Assessment Limit(s)	Resources
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,	Pages 31-33; Items are limited to linear, quadratic, and exponential. Students will graph a linear, quadratic, or exponential function using key features. Students will identify and interpret key features of a graph within the real-world context that the function represents. For F-IF.3.7a, quadratic functions that are given in the form $y = ax^2 + bx + c$, a, b, and c must be integers. Quadratic functions given in vertex form $y = a(x – h)^2 + k$, a, h, and k must be integers. Quadratic functions given in other forms should be able to be rewritten and adhere to one of the two previous forms. For F-IF.3.7e, exponential functions are limited to simple exponential growth	MFAS: Graphing a Step Function Lesson: Graphing Quadratic Equations

	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. Content Complexity: Level 2: Basic Application of Skills & Concepts	and decay functions and to exponential functions with one translation. Base *e* should not be used. Item assessed with and/or without calculator.	
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* $y = 1.02^t$, $y = 0.97^t$, $y = 1.01^{12t}$, $y = (0.97)^{t/10}$, *and classify them as representing exponential growth or decay.* Content Complexity: Level 2: Basic Application of Skills & Concepts	Pages 31-33; Students will identify zeros, extreme values, and symmetry of a quadratic function written symbolically. Students will classify the exponential function as exponential growth or decay by examining the base, and students will give the rate of growth or decay. Students will use the properties of exponents to interpret exponential expressions in a real-world context. Students will write an exponential function defined by an expression in different but equivalent forms to reveal and explain different properties of the function, and students will determine which form of the function is the most appropriate for interpretation for a real-world context. For F-IF.3.8a, items that require the student to transform a quadratic equation to vertex form, *b*/*a* must be an even integer. For F-IF.3.8b, exponential functions are limited to simple exponential growth and decay functions and to exponential functions with one translation. Base *e* should not be used. Items may specify a required form using an equation or using common terminology such as standard form. Item assessed with and/or without calculator.	MFAS: Exponential Functions Lesson: Forming Quadratics
MAFS.912.F-IF.2.6	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal	Pages 28-29; Students will differentiate between different types of functions using a variety of descriptors (e.g., graphically, verbally,	MFAS: Comparing Quadratics

	descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.* Content Complexity: Level 2: Basic Application of Skills & Concepts	numerically, and algebraically). Students will compare and contrast properties of two functions using a variety of function representations (e.g., algebraic, graphic, numeric in tables, or verbal descriptions). Item assessed with and/or without calculator.	Problem-Solving Task: Throwing Baseballs

Domain: Functions-Linear, Quadratic, & Exponential Models

Cluster 1 *(Supporting): Construct and compare linear, quadratic, and exponential models and solve problems.*

Standard Code	Standard	Clarification(s) & Assessment Limit(s)	Resources
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. Content Complexity: Level 3: Strategic Thinking & Complex Reasoning	Page 34; Students will determine whether the real-world context may be represented by a linear function or an exponential function and give the constant rate or the rate of growth or decay. Students will choose an explanation as to why a context may be modeled by a linear function or an exponential function. Students will interpret the rate of change and intercepts of a linear function when given an equation that models a real-world context. Exponential functions should be in the form $a(b)^x + k$. Item assessed with and/or without calculator.	MFAS: How Does Your Garden Grow? Lesson: Appreciation for Car Depreciation
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). ★ Content Complexity: Level 2: Basic Application of Skills & Concepts	Pages 35-36; Students will write a linear function, an arithmetic sequence, an exponential function, or a geometric sequence when given a graph that models a real-world context. Students will write a linear function, an arithmetic sequence, an exponential function, or a geometric sequence when given a verbal description of a real-world context. Students will write a linear function, an arithmetic sequence, an exponential function, or a geometric sequence when given a table of values or a set of ordered pairs that model a	MFAS: What is the Function Rule? Original Tutorial: Creating Exponential Functions

		real-world context. In items where the student must write a function using arithmetic operations or by composing functions, the student should have to generate the new function only. In items where the student constructs an exponential function, a geometric sequence, or a recursive definition from input-output pairs, at least two sets of pairs must have consecutive inputs. In items that require the student to construct arithmetic or geometric sequences, the real-world context should be discrete. In items that require the student to construct a linear or exponential function, the real-world context should be continuous. Item assessed with and/or without calculator.	
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. ★ Content Complexity: Level 2: Basic Application of Skills & Concepts	Page 37; Students will compare a linear function and an exponential function given in real-world context by interpreting the functions' graphs. Students will compare a linear function and an exponential function given in a real-world context through tables. Students will compare a quadratic function and an exponential function given in real-world context by interpreting the functions' graphs. Students will compare a quadratic function and an exponential function given in a real-world context through tables. Item assessed with and/or without calculator.	MFAS: Compare Linear and Exponential Functions Problem-Solving Task: Exponential growth versus linear growth

Cluster 2 *(Supporting): Interpret expressions for functions in terms of the situation they model.*

Standard Code	Standard	Clarification(s) & Assessment Limit(s)	Resources
MAFS.912.F-LE.2.5	Interpret the parameters in a linear or exponential function in terms of a context. ★ Content Complexity: Level 2: Basic Application of Skills & Concepts	Page 34; Students will interpret the rate of change and intercepts of a linear function when given an equation that models a real-world context. Students will interpret the x-intercept, y-intercept, and/or rate of	MFAS: Computer Repair

		growth or decay of an exponential function given in a real-world context. Item assessed with and/or without calculator.	

Domain: Statistics & Probability-Interpreting Categorical & Quantitative Data

Cluster 1 *(Additional): Summarize, represent, and interpret data on a single count or measurement variable.*

Standard Code	Standard	Clarification(s) & Assessment Limit(s)	Resources
MAFS.912.S-ID.1.1	Represent data with plots on the real number line (dot plots, histograms, and box plots). ★ Content Complexity: Level 2: Basic Application of Skills & Concepts	Page 39; Students will represent data using a dot plot, a histogram, or a box plot. Item assessed with and/or without calculator.	MFAS: Trees in the Park Lesson: Advantages and Disadvantages of Dot Plots, Histograms, and Box Plots
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. ★ Content Complexity: Level 2: Basic Application of Skills & Concepts	Page 40; Students will identify similarities and differences in shape, center, and spread when given two or more data sets. Students will predict the effect that an outlier will have on the shape, center, and spread of a data set. Items may require the student to calculate mean, median, and interquartile range for the purpose of identifying similarities and differences. Items should not require the student to calculate the standard deviation. Item assessed with and/or without calculator.	MFAS: Texting During Lunch Lesson: The Debate: Who is a Better Baller?
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). ★ Content Complexity: Level 2: Basic Application of Skills & Concepts	Page 40; Students will interpret similarities and differences in shape, center, and spread when given two or more data sets within the real-world context given. Items should not require the student to fit normal curves to data. Data distributions should be approximately normal. Data sets should be real-world and quantitative. Item assessed with and/or without calculator.	MFAS: Total Points Scored Lesson: Bowling for Box Plots

Cluster 2 *(Supporting): Summarize, represent, and interpret data on two categorical and quantitative variables.*

Standard Code	Standard	Clarification(s) & Assessment Limit(s)	Resources
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. ★ Content Complexity: Level 2: Basic Application of Skills & Concepts	Page 41; Students will create or complete a two-way frequency table to summarize categorical data. Students will determine if associations/trends are appropriate for the data. Students will interpret data displayed in a two-way frequency table. Students will calculate joint, marginal, and conditional relative frequencies. In data with only two categorical variables, items should require the student to determine relative frequencies and use the frequencies to complete the table or to answer questions. Item assessed with and/or without calculator.	MFAS: Breakfast Drink Preference Original Tutorial: Data and Frequencies
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. Content Complexity: Level 2: Basic Application of Skills & Concepts	Pages 42-43; Students will represent data on a scatter plot. Students will identify a linear function, a quadratic function, or an exponential function that was found using regression. Students will use a regression equation to solve problems in the context of the data. Students will calculate residuals. Students will create a residual plot and determine whether a function is an appropriate fit for the data. Item assessed with and/or without calculator.	MFAS: Residuals Lesson: Calculating Residuals and Constructing a Residual Plot with Soccer Seats

Cluster 3 *(Major): Interpret linear models.*

Standard Code	Standard	Clarification(s) & Assessment Limit(s)	Resources
MAFS.912.S-ID.3.7	Interpret the slope (rate of change) and the intercept (constant term) of	Page 30; Students will interpret the y-intercept of a linear model that represents a set of data with a real-	MFAS: Intercept for Life

	a linear model in the context of the data. ★ Content Complexity: Level 2: Basic Application of Skills & Concepts	world context. Items should include data sets. Data sets must contain at least six data pairs. The linear function given in the item should be the regression equation. The rate of change and the *y*-intercept should have a value with at least a hundredths place value. Item assessed with and/or without calculator.	Expectancy Lesson: Slope and y-intercept of a Statistical Model
MAFS.912.S-ID.3.8	Compute (using technology) and interpret the correlation coefficient of a linear fit. ★ Content Complexity: Level 2: Basic Application of Skills & Concepts	Pages 42-43; Students will determine the fit of a function by analyzing the correlation coefficient. In items that require the student to interpret or use the correlation coefficient, the value of the correlation coefficient must be given in the stem. Item assessed with and/or without calculator.	MFAS: Correlation Order Lesson: Scrambled Coefficient
MAFS.912.S-ID.3.9	Distinguish between correlation and causation. ★ Content Complexity: Level 2: Basic Application of Skills & Concepts	Pages 42-43; Students will distinguish between situations where correlation does not imply causation. Students will distinguish variables that are correlated because one is the cause of another. Item assessed with and/or without calculator.	MFAS: Does Studying Pay? Lesson: Correlation or Causation: That is the question

Algebra 1 Resources

Course Descriptions, Standards, and Resources

- Algebra 1 Course Description
- Algebra 1 Honors Course Description
- Algebra 1 Student Resources
- Text Complexity Resources
- Florida Assessments for Instruction in Mathematics (FAIM)
- Student Support Resources
- Parent Support Resources

Florida Standards Assessment Assistance

- Test Item Specifications
- Test Design Summary and Blueprint
- FSA Fact Sheet
- Calculator and Reference Sheet Policy
- Reference Sheet