

FSA EOC Tutorials for Florida are designed specifically for the Mathematics Florida Standards to prepare students for the Florida Standards Assessments (FSA). EOC Categories are at the heart of FSA EOC Tutorial structure – bringing category-based learning to the student experience, and category-based performance and progress tracking to the teacher experience.

Math Tutorials offer targeted instruction, practice and review designed to develop computational fluency, deepen conceptual understanding, and apply mathematical practices. They automatically identify and address learning gaps down to elementary-level content, using adaptive remediation to bring students to grade-level no matter where they start. Students engage with the content in an interactive, feedback-rich environment as they progress through standards-aligned modules. By constantly honing the ability to apply their knowledge in abstract and real world scenarios, students build the depth of knowledge and higher order skills required to demonstrate their mastery when put to the test.

In each module, the Learn It and Try It make complex ideas accessible to students through focused content, modeled logic and process, multi-modal representations, and personalized feedback as students reason through increasingly challenging problems. The Review It offers a high impact summary of key concepts and relates those concepts to students' lives. The Test It assesses students' mastery of the module's concepts, providing granular performance data to students and teachers after each attempt. To help students focus on the content most relevant to them, unit-level pretests and posttests can quickly identify where students are strong and where they're still learning.

Test-Taking Strategies for EOC Tutorials allow students to practice and apply learning approaches that will hone their test-taking skills and focus them for success on the day of their EOC test.

1. REAL NUMBER SYSTEM

• OPERATIONS ON RATIONAL AND IRRATIONAL NUMBERS

- **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.

• LAWS OF EXPONENTS

- **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.
- **MAFS.912.N-RN.1.2** Rewrite expressions involving radicals and rational exponents using the properties of exponents.

2. EQUATIONS AND INEQUALITIES

• ONE-STEP EQUATIONS AND INEQUALITIES

- **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-REI.2.3** Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

• MULTI-STEP EQUATIONS AND INEQUALITIES

- **MAFS.912.A-REI.2.3** Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
- **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.

• AXIOMS OF EQUALITY

- **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.

- **LITERAL EQUATIONS**

- **MAFS.912.A-REI.2.3** Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
- **MAFS.912.A-CED.1.4** Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.

3. WRITING EXPRESSIONS AND EQUATIONS

- **FORMULATING AND SIMPLIFYING ALGEBRAIC EXPRESSIONS**

- **MAFS.912.A-SSE.1.1.a** Interpret parts of an expression, such as terms, factors, and coefficients.
- **MAFS.912.A-SSE.1.2** Use the structure of an expression to identify ways to rewrite it.

- **FORMULATING AND SOLVING EQUATIONS FROM WORD PROBLEMS**

- **MAFS.912.A-SSE.1.1.a** Interpret parts of an expression, such as terms, factors, and coefficients.
- **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.

- **FORMULATING AND SOLVING INEQUALITIES FROM WORD PROBLEMS**

- **MAFS.912.A-SSE.1.1.a** Interpret parts of an expression, such as terms, factors, and coefficients.
- **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.

4. FUNCTIONS

- **FUNCTIONS AND RELATIONS**

- **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.1.1** 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 $y = f(x)$.

- **DOMAIN AND RANGE**

- **MAFS.912.F-IF.2.5** Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.

- **EVALUATING FUNCTIONS**

- **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.

5. LINEAR FUNCTIONS

- **SLOPE**

- **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.
- **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.

- **GRAPHING AND ANALYZING LINEAR FUNCTIONS**

- **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-IF.2.5** Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
- **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.

6. LINEAR EQUATIONS

● SLOPE-INTERCEPT FORM OF A LINEAR EQUATION

- **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-IF.3.7.a** Graph linear and quadratic functions and show intercepts, maxima, and minima.
- **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).

● POINT-SLOPE FORM OF A LINEAR EQUATION

- **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.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.F-IF.3.7.a** Graph linear and quadratic functions and show intercepts, maxima, and minima.

● GRAPHING AND MANIPULATING $Y = MX + B$

- **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-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.
- **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-LE.2.5** Interpret the parameters in a linear or exponential function in terms of a context.
- **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.F-IF.3.7.a** Graph linear and quadratic functions and show intercepts, maxima, and minima.

7. LINEAR SYSTEMS

● SOLVING SYSTEMS OF LINEAR EQUATIONS: GUESS AND CHECK

- **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.
- **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.

● SOLVING SYSTEMS OF LINEAR EQUATIONS: GRAPHING

- **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.
- **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.4.11** 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.

● SOLVING SYSTEMS OF LINEAR EQUATIONS: SUBSTITUTION

- **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.
- **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.

- **SOLVING SYSTEMS OF LINEAR EQUATIONS: ELIMINATION**

- **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.
- **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.3.5** 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.

8. LINEAR INEQUALITIES

- **GRAPHS OF LINEAR INEQUALITIES**

- **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.
- **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.

- **SOLVING SYSTEMS OF LINEAR INEQUALITIES**

- **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.
- **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.

9. EXPONENTIAL FUNCTIONS, EQUATIONS, AND INEQUALITIES

- **EXPONENTIAL FUNCTIONS**

- **MAFS.912.A-SSE.2.3.c** Use the properties of exponents to transform expressions for exponential functions.
- **MAFS.912.F-IF.3.8.b** Use the properties of exponents to interpret expressions for exponential functions.
- **MAFS.912.F-IF.3.7.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.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.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.
- **MAFS.912.F-IF.2.5** Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
- **MAFS.912.F-LE.2.5** Interpret the parameters in a linear or exponential function in terms of a context.
- **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.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.A-SSE.1.1.b** Interpret complicated expressions by viewing one or more of their parts as a single entity.

- **EXPONENTIAL GROWTH AND DECAY**

- **MAFS.912.F-LE.2.5** Interpret the parameters in a linear or exponential function in terms of a context.
- **MAFS.912.F-IF.3.8.b** Use the properties of exponents to interpret expressions for exponential functions.
- **MAFS.912.A-SSE.1.1.b** Interpret complicated expressions by viewing one or more of their parts as a single entity.
- **MAFS.912.F-LE.1.1.a** Prove that linear functions grow by equal differences over equal intervals, and that exponential

functions grow by equal factors over equal intervals.

- **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.1.1.b** Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.
- **MAFS.912.F-LE.1.1.c** Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
- **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.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).

● SOLVING EXPONENTIAL INEQUALITIES

- **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.
- **MAFS.912.A-SSE.1.1.b** Interpret complicated expressions by viewing one or more of their parts as a single entity.
- **MAFS.912.F-LE.1.1.c** Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
- **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.

10. SEQUENCES

● SEQUENCES

- **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-IF.1.3** Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.
- **MAFS.912.F-BF.1.1.a** Determine an explicit expression, a recursive process, or steps for calculation from a context.

● ARITHMETIC AND GEOMETRIC SEQUENCES

- **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-IF.1.3** Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.
- **MAFS.912.F-BF.1.1.a** Determine an explicit expression, a recursive process, or steps for calculation from a context.

11. POLYNOMIALS

● POLYNOMIAL BASICS

- **MAFS.912.A-SSE.1.2** Use the structure of an expression to identify ways to rewrite it.
- **MAFS.912.A-SSE.1.1.a** Interpret parts of an expression, such as terms, factors, and coefficients.

● ADDITION AND SUBTRACTION OF POLYNOMIALS

- **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.
- **MAFS.912.A-SSE.1.2** Use the structure of an expression to identify ways to rewrite it.

● MULTIPLICATION OF POLYNOMIALS

- **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.

12. FACTORING 1

• FACTORING QUADRATIC TRINOMIALS

- **MAFS.912.A-SSE.2.3.a** Factor a quadratic expression to reveal the zeros of the function it defines.
- **MAFS.912.A-REI.2.4.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 .

13. FACTORING 2

• FACTORING SPECIAL CASES

- **MAFS.912.A-SSE.1.2** Use the structure of an expression to identify ways to rewrite it.
- **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-SSE.1.1.b** Interpret complicated expressions by viewing one or more of their parts as a single entity.

• FACTORING HIGHER-ORDER POLYNOMIALS

- **MAFS.912.A-SSE.1.2** Use the structure of an expression to identify ways to rewrite it.
- **MAFS.912.A-SSE.1.1.b** Interpret complicated expressions by viewing one or more of their parts as a single entity.
- **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.

14. QUADRATIC FUNCTIONS

• QUADRATIC FUNCTIONS

- **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.

• ANALYZING GRAPHS OF QUADRATIC FUNCTIONS

- **MAFS.912.F-IF.2.5** Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
- **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.
- **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.
- **MAFS.912.F-IF.3.7.a** Graph linear and quadratic functions and show intercepts, maxima, and minima.

15. SOLVING QUADRATIC EQUATIONS

• REPRESENTATIONS OF QUADRATIC FUNCTIONS

- **MAFS.912.A-SSE.1.2** Use the structure of an expression to identify ways to rewrite it.
- **MAFS.912.A-REI.2.4.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.
- **MAFS.912.F-IF.3.8.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.
- **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-SSE.2.3.a** Factor a quadratic expression to reveal the zeros of the function it defines.
- **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.
- **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.

- **SOLVING QUADRATIC EQUATIONS BY FACTORING**

- **MAFS.912.A-REI.2.4.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.2.3.a** Factor a quadratic expression to reveal the zeros of the function it defines.
- **MAFS.912.F-IF.3.7.a** Graph linear and quadratic functions and show intercepts, maxima, and minima.
- **MAFS.912.F-IF.3.8.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.
- **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.

- **COMPLETING THE SQUARE**

- **MAFS.912.A-REI.2.4.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.2.4.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.
- **MAFS.912.A-SSE.2.3.b** Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.
- **MAFS.912.F-IF.3.7.a** Graph linear and quadratic functions and show intercepts, maxima, and minima.
- **MAFS.912.F-IF.3.8.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.

- **QUADRATIC 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.
- **MAFS.912.A-REI.2.4.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.2.4.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.

16. PARENT FUNCTIONS

- **LINEAR AND EXPONENTIAL PARENT FUNCTIONS**

- **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.F-IF.2.5** Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.

- **QUADRATIC PARENT FUNCTION**

- **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.F-IF.2.5** Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.

17. TRANSFORMATIONS OF PARENT FUNCTIONS

- **T TRANSFORMATIONS OF THE LINEAR AND EXPONENTIAL PARENT FUNCTIONS**

- **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.

- **T TRANSFORMATIONS OF THE QUADRATIC PARENT FUNCTION**

- **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.

18. NONLINEAR FUNCTIONS

• LINEAR VERSUS NONLINEAR FUNCTIONS

- **MAFS.912.F-LE.1.1.a** Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.
- **MAFS.912.F-LE.1.1.b** Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.
- **MAFS.912.F-LE.1.1.c** Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
- **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.
- **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.3.9** Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).

• ABSOLUTE VALUE FUNCTIONS

- **MAFS.912.F-IF.2.5** Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
- **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.
- **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.

• GRAPHS OF POLYNOMIAL FUNCTIONS

- **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.
- **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.

19. ADVANCED SYSTEMS OF EQUATIONS

• SOLVING THREE-VARIABLE SYSTEMS OF LINEAR EQUATIONS

- **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-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.

• SYSTEMS OF NONLINEAR EQUATIONS

- **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.

20. WORKING WITH FUNCTIONS

• ARITHMETIC OPERATIONS ON FUNCTIONS

- **MAFS.912.F-BF.1.1.b** Combine standard function types using arithmetic operations.

- **MULTIPLE REPRESENTATIONS OF FUNCTIONS**

- **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).

21. STATISTICS

- **DATA ANALYSIS**

- **MAFS.912.S-ID.1.1** Represent data with plots on the real number line (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.
- **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).

- **FREQUENCY TABLES**

- **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.

22. SCATTERPLOTS

- **SCATTERPLOTS**

- **MAFS.912.S-ID.3.9** Distinguish between correlation and causation.
- **MAFS.912.S-ID.2.6.b** Informally assess the fit of a function by plotting and 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.2.6.c** Fit a linear function for a scatter plot that suggests a linear association.

- **SCATTERPLOTS AND MODELING**

- **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.2.6.a** Fit a function to the data; use functions fitted to data to solve problems in the context of the data.
- **MAFS.912.S-ID.2.6.c** Fit a linear function for a scatter plot that suggests a linear association.
- **MAFS.912.S-ID.2.6.b** Informally assess the fit of a function by plotting and analyzing residuals.
- **MAFS.912.S-ID.3.8** Compute (using technology) and interpret the correlation coefficient of a linear fit.

23. TEST-TAKING STRATEGIES

- **STUDY HABITS**

- **BEING PREPARED AND GETTING STARTED**

- **WORDING IN TEST QUESTIONS**

- **WORDING IN ANSWER CHOICES**

- **QUESTIONS WITH PASSAGES AND VISUAL DATA**

- **ESSAY AND SHORT ANSWER QUESTIONS**

- **WORD PROBLEMS**