

Maryland Tutorials are designed specifically for the Maryland College and Career-Ready Standards to prepare students for the PARCC assessment, the Maryland School Assessment (MSA), and the Maryland High School Assessment (HSA).

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.

1. RELATIONSHIPS BETWEEN QUANTITIES

● MONITORING PRECISION AND ACCURACY

- **N.Q.1.A** Ability to choose appropriate units of measure to represent context of the problem
- **N.Q.1.B** Ability to convert units of measure using dimensional analysis
- **N.Q.2.A** Ability to select and use units of measure to accurately model a given real world scenario
- **N.Q.3.A** Knowledge of and ability to apply rules of significant digits
- **N.Q.3.B** Ability to use precision of initial measurements to determine the level of precision with which answers can be reported

● ONE-STEP EQUATIONS AND INEQUALITIES

- **A.REI.3.B** Ability to accurately perform the steps needed to solve a linear equation/inequality
- **A.CED.1.A** Ability to distinguish between linear, quadratic and exponential relationships given the verbal, numeric and/or graphic representations
- **A.REI.1.A** Ability to identify the mathematical property (addition property of equality, distributive property, etc.) used at each step in the solution process as a means of justifying a step
- **A.REI.3.A** Ability to analyze the structure of an equation to determine the sequence of steps that need to be applied to arrive at a solution

● MULTI-STEP EQUATIONS AND INEQUALITIES

- **A.REI.1.A** Ability to identify the mathematical property (addition property of equality, distributive property, etc.) used at each step in the solution process as a means of justifying a step
- **A.REI.3.B** Ability to accurately perform the steps needed to solve a linear equation/inequality
- **A.REI.3.A** Ability to analyze the structure of an equation to determine the sequence of steps that need to be applied to arrive at a solution
- **A.CED.1.A** Ability to distinguish between linear and exponential relationships given multiple representations and then create the appropriate equation/inequality using given information

2. AXIOMS OF EQUALITY AND LITERAL EQUATIONS

● AXIOMS OF EQUALITY

- **A.SSE.2.A** Ability to use properties of mathematics to alter the structure of an expression
- **A.REI.1.A** Ability to identify the mathematical property (addition property of equality, distributive property, etc.) used at each step in the solution process as a means of justifying a step

- **LITERAL EQUATIONS**

- **A.REI.3.B** Ability to accurately perform the steps needed to solve a linear equation/inequality
- **A.CED.4.A** Ability to recognize and create different forms of literal equations
- **A.REI.3.A** Ability to analyze the structure of an equation to determine the sequence of steps that need to be applied to arrive at a solution
- **A.REI.4.a.1** Ability to solve literal equations for a variable of interest

3. WRITING EXPRESSIONS AND EQUATIONS

- **FORMULATING AND SIMPLIFYING ALGEBRAIC EXPRESSIONS**

- **A.SSE.1.a.1** Ability to make connections between symbolic representations and proper mathematics vocabulary
- **A.SSE.1.a.2** Ability to identify parts of an expression such as terms, factors, coefficients, etc.
- **A.SSE.1.b.1** Ability to interpret and apply rules for order of operations
- **A.SSE.2.A** Ability to use properties of mathematics to alter the structure of an expression
- **A.SSE.2.B** Ability to select and then use an appropriate factoring technique

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

- **A.SSE.1.a.1** Ability to make connections between symbolic representations and proper mathematics vocabulary
- **F.LE.1.b.1** Ability to recognize a linear relationship
- **F.LE.2.A** Ability to produce an algebraic model
- **A.CED.1.A** Ability to distinguish between linear, quadratic and exponential relationships given the verbal, numeric and/or graphic representations
- **A.REI.3.B** Ability to accurately perform the steps needed to solve a linear equation/inequality
- **A.SSE.1.a.2** Ability to identify parts of an expression such as terms, factors, coefficients, etc.

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

- **A.SSE.1.a.1** Ability to make connections between symbolic representations and proper mathematics vocabulary
- **A.CED.1.A** Ability to distinguish between linear and exponential relationships given multiple representations and then create the appropriate equation/inequality using given information
- **A.REI.3.B** Ability to accurately perform the steps needed to solve a linear equation/inequality
- **A.SSE.1.a.2** Ability to identify parts of an expression such as terms, factors, coefficients, etc.
- **A.REI.3.A** Ability to analyze the structure of an equation to determine the sequence of steps that need to be applied to arrive at a solution
- **F.IF.4.B** Ability to connect appropriate function to context

4. FUNCTIONS

- **FUNCTIONS AND RELATIONS**

- **F.IF.1.C** Ability to use of function notation
- **F.IF.2.A** Ability to make connections between context and algebraic representations which use function notation
- **F.IF.1.A** Ability to determine if a relation is a function
- **F.IF.1.D** Knowledge of and ability to apply the vertical line test
- **F.IF.1.B** Ability to identify the domain and range of a function from multiple representations
- **F.IF.5.A** Ability to relate the concept of domain to each function studied
- **F.IF.5.C** Ability to recognize and use alternate vocabulary for domain and range such as input/output or independent/dependent
- **F.IF.7.b.2** Ability to make connections between a function's domain and range and the appearance of the graph of the function

- **F.IF.4.B** Ability to connect appropriate function to context
- **F.IF.9.A** Ability to connect experience with comparing linear and exponential functions from Unit 2 of this course to include quadratic functions

- **DOMAIN AND RANGE**

- **F.IF.5.A** Ability to relate the concept of domain to each function studied
- **F.IF.5.B** Ability to describe the restrictions on the domain of a function based on real world context
- **F.IF.1.B** Ability to identify the domain and range of a function from multiple representations
- **F.IF.5.C** Ability to recognize and use alternate vocabulary for domain and range such as input/output or independent/dependent

- **EVALUATING FUNCTIONS**

- **F.IF.1.C** Ability to use of function notation
- **F.IF.4.A** Ability to translate from algebraic representations to graphic or numeric representations and identify key features using the various representations
- **F.IF.2.A** Ability to make connections between context and algebraic representations which use function notation
- **F.IF.5.A** Ability to relate the concept of domain to each function studied
- **F.IF.5.B** Ability to describe the restrictions on the domain of a function based on real world context

5. INTRODUCTION TO LINEAR RELATIONSHIPS

- **SLOPE**

- **F.IF.4.A** Ability to translate from algebraic representations to graphic or numeric representations and identify key features using the various representations
- **F.IF.6.B** Ability to identify the rate of change from multiple representations
- **F.IF.6.A** Knowledge that the rate of change of a function can be positive, negative or zero

- **GRAPHING AND ANALYZING LINEAR FUNCTIONS**

- **F.LE.2.A** Ability to produce an algebraic model
- **F.IF.4.A** Ability to translate from algebraic representations to graphic or numeric representations and identify key features using the various representations
- **F.IF.1.B** Ability to identify the domain and range of a function from multiple representations
- **F.IF.5.A** Ability to relate the concept of domain to each function studied
- **F.IF.5.B** Ability to describe the restrictions on the domain of all functions based on real world context
- **F.IF.9.A** Ability to connect experience with comparing linear and exponential functions from Unit 2 of this course to include quadratic functions
- **F.IF.7.a.1** Ability to connect experience with graphing linear functions from Unit 2 of this course to include quadratic functions

6. GRAPHS OF LINEAR EQUATIONS AND INEQUALITIES

- **GRAPHING AND MANIPULATING $Y = MX + B$**

- **F.IF.7.a.1** See the skills and knowledge that are stated in the Standard.
- **F.BF.3.A** Ability to make generalizations about the changes that will result in the graph of any function as a result of making a particular change to the algebraic representation of the function
- **A.CED.2.B** Ability to determine unknown parameters needed to create an equation that accurately models a given situation
- **F.IF.6.B** Ability to identify the rate of change from multiple representations
- **F.LE.5.A** Ability to interpret the slope and y-intercept of a linear model in terms of context
- **F.IF.4.A** Ability to translate from algebraic representations to graphic or numeric representations and identify key features using the various representations
- **F.LE.1.b.1** Ability to recognize a linear relationship
- **F.LE.2.A** Ability to produce an algebraic model

- **GRAPHS OF LINEAR INEQUALITIES**

GRAPHING OF LINEAR INEQUALITIES

- **A.REI.3.B** Ability to accurately perform the steps needed to solve a linear equation/inequality
- **A.REI.12.A** Ability to explain why a particular shaded region represents the solution of a given linear inequality or system of linear inequalities
- **A.REI.12.B** Ability to convey the mathematics behind the dotted versus solid boundary lines used when graphing the solutions to linear inequalities
- **A.CED.3.A** Ability to distinguish between a mathematical solution and a contextual solution

7. LINEAR EQUATIONS

• SLOPE-INTERCEPT FORM OF A LINEAR EQUATION

- **F.LE.5.A** Ability to interpret the slope and y-intercept of a linear model in terms of context
- **F.IF.7.a.1** Ability to connect experience with graphing linear functions from Unit 2 of this course to include quadratic functions
- **F.LE.2.A** Ability to produce an algebraic model
- **A.REI.10.A** Ability to construct an argument as to how the points that make up a curve connect to an algebraic representation of the function that is being represented by the graph
- **F.IF.6.B** Ability to identify the rate of change from multiple representations
- **F.IF.9.A** Ability to connect experience with comparing linear and exponential functions from Unit 2 of this course to include quadratic functions

• POINT-SLOPE FORM OF A LINEAR EQUATION

- **F.IF.7.a.1** Ability to connect experience with graphing linear functions from Unit 2 of this course to include quadratic functions
- **F.LE.1.b.1** Ability to recognize a linear relationship
- **F.LE.2.A** Ability to produce an algebraic model
- **F.BF.3.A** Ability to make generalizations about the changes that will result in the graph of any function as a result of making a particular change to the algebraic representation of the function

8. INTRODUCTION TO TWO-VARIABLE LINEAR SYSTEMS

• SOLVING SYSTEMS OF LINEAR EQUATIONS: GUESS AND CHECK

- **A.CED.3.A** Ability to distinguish between a mathematical solution and a contextual solution
- **F.LE.2.A** Ability to produce an algebraic model
- **A.CED.2.A** Ability to distinguish between linear and exponential relationships given multiple representations
- **F.IF.2.A** Ability to make connections between context and algebraic representations which use function notation
- **A.REI.6.A** Ability to extend experiences with solving simultaneous linear equations from 8EE.8 b&c to include more complex situations
- **A.REI.5.A** Ability to use various methods for solving systems of equations algebraically

• SOLVING SYSTEMS OF LINEAR EQUATIONS: GRAPHING

- **A.REI.6.A** Ability to extend experiences with solving simultaneous linear equations from 8EE.8 b&c to include more complex situations
- **A.REI.11.A** Ability to show the equality of two functions using multiple representations
- **A.CED.2.B** Ability to determine unknown parameters needed to create an equation that accurately models a given situation
- **A.CED.3.A** Ability to distinguish between a mathematical solution and a contextual solution

9. SOLVING TWO-VARIABLE LINEAR SYSTEMS

• SOLVING SYSTEMS OF LINEAR EQUATIONS: SUBSTITUTION

- **A.CED.2.B** Ability to determine unknown parameters needed to create an equation that accurately models a given situation
- **A.CED.3.A** Ability to distinguish between a mathematical solution and a contextual solution
- **A.CED.2.A** Ability to distinguish between linear and exponential relationships given multiple representations
- **A.REI.5.A** Ability to use various methods for solving systems of equations algebraically
- **A.REI.6.A** Ability to extend experiences with solving simultaneous linear equations from 8EE.8 b&c to include more complex

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

- **A.CED.2.B** Ability to determine unknown parameters needed to create an equation that accurately models a given situation
- **A.REI.5.A** Ability to use various methods for solving systems of equations algebraically
- **A.REI.6.A** Ability to extend experiences with solving simultaneous linear equations from 8EE.8 b&c to include more complex situations
- **A.CED.3.A** Ability to distinguish between a mathematical solution and a contextual solution

- **SOLVING SYSTEMS OF LINEAR INEQUALITIES**

- **A.CED.2.B** Ability to determine unknown parameters needed to create an equation that accurately models a given situation
- **A.REI.3.B** Ability to accurately perform the steps needed to solve a linear equation/inequality
- **A.REI.12.A** Ability to explain why a particular shaded region represents the solution of a given linear inequality or system of linear inequalities
- **A.REI.12.B** Ability to convey the mathematics behind the dotted versus solid boundary lines used when graphing the solutions to linear inequalities
- **A.CED.3.A** Ability to distinguish between a mathematical solution and a contextual solution

10. INTRODUCTION TO EXPONENTIAL FUNCTIONS

- **EXPONENTIAL FUNCTIONS**

- **A.SSE.1.a.2** Ability to identify parts of an expression such as terms, factors, coefficients, etc.
- **F.LE.5.B** Ability to identify the initial amount present in an exponential model ($f(0) = b^0 + k = 1 + k$)
- **A.SSE.1.a.1** Ability to extend knowledge of A.SSE.1b from Unit 1 of this course to include quadratic and exponential expressions
- **F.IF.9.A** Ability to connect experience with comparing linear and exponential functions from Unit 2 of this course to include quadratic functions
- **A.REI.10.A** Ability to construct an argument as to how the points that make up a curve connect to an algebraic representation of the function that is being represented by the graph
- **F.LE.5.C** Ability to interpret the rate of increase/decrease in an exponential model
- **F.IF.5.A** Ability to relate the concept of domain to each function studied
- **A.CED.1.A** Ability to distinguish between linear and exponential relationships given multiple representations and then create the appropriate equation/inequality using given information
- **A.REI.3.A** Ability to analyze the structure of an equation to determine the sequence of steps that need to be applied to arrive at a solution
- **F.IF.4.A** Ability to translate from algebraic representations to graphic or numeric representations and identify key features using the various representations
- **F.LE.1.c.1** Ability to recognize an exponential relationship
- **F.LE.2.A** Ability to produce an algebraic model
- **A.SSE.1.b.1** Ability to extend knowledge of A.SSE.1b from Unit 1 of this course to quadratic and exponential expressions
- **A.SSE.3.c.1** Ability to connect experience with properties of exponents from Unit 2 of this course to more complex expressions

- **EXPONENTIAL GROWTH AND DECAY**

- **A.SSE.1.a.2** Ability to identify parts of an expression such as terms, factors, coefficients, etc.
- **F.LE.2.A** Ability to produce an algebraic model
- **F.LE.5.B** Ability to identify the initial amount present in an exponential model ($f(0) = b^0 + k = 1 + k$)
- **A.SSE.1.a.1** Ability to extend knowledge of A.SSE.1b from Unit 1 of this course to include quadratic and exponential expressions
- **A.SSE.1.b.1** Ability to extend knowledge of A.SSE.1b from Unit 1 of this course to quadratic and exponential expressions
- **A.CED.2.B** Ability to determine unknown parameters needed to create an equation that accurately models a given situation
- **A.REI.3.A** Ability to analyze the structure of an equation to determine the sequence of steps that need to be applied to arrive at a solution

- **F.LE.1.a.1** See the skills and knowledge that are stated in the Standard.
- **F.LE.1.b.1** Ability to recognize a linear relationship
- **F.LE.3.A** See the skills and knowledge that are stated in the Standard.
- **A.CED.2.A** Ability to distinguish between linear, quadratic and exponential relationships given numeric, or verbal representations
- **A.CED.1.A** Ability to distinguish between linear and exponential relationships given multiple representations and then create the appropriate equation/inequality using given information
- **F.LE.1.c.1** Ability to recognize an exponential relationship
- **F.IF.9.A** Ability to connect experience with comparing linear and exponential functions from Unit 2 of this course to include quadratic functions

11. EXAMINING EXPONENTIAL RELATIONSHIPS

• SOLVING EXPONENTIAL INEQUALITIES

- **F.LE.2.A** Ability to produce an algebraic model
- **F.LE.5.B** Ability to identify the initial amount present in an exponential model ($f(0) = b^0 + k = 1 + k$)
- **A.SSE.1.b.1** Ability to extend knowledge of A.SSE.1b from Unit 1 of this course to quadratic and exponential expressions
- **A.CED.2.B** Ability to determine unknown parameters needed to create an equation that accurately models a given situation
- **A.REI.3.A** Ability to analyze the structure of an equation to determine the sequence of steps that need to be applied to arrive at a solution
- **F.LE.1.c.1** Ability to recognize an exponential relationship

• LINEAR AND EXPONENTIAL PARENT FUNCTIONS

- **F.IF.7.b.1** Ability to make a quick sketch of each parent function over the set of real numbers
- **F.LE.2.A** Ability to produce an algebraic model
- **F.IF.7.b.3** Knowledge of how parameters introduced into a function alter the shape of the graph of the parent function
- **F.IF.9.A** Ability to connect experience with comparing linear and exponential functions from Unit 2 of this course to include quadratic functions
- **F.IF.5.A** Ability to relate the concept of domain to each function studied
- **F.IF.5.B** Ability to describe the restrictions on the domain of a function based on real world context
- **F.LE.5.B** Ability to identify the initial amount present in an exponential model ($f(0) = b^0 + k = 1 + k$)

• TRANSFORMATIONS OF THE LINEAR AND EXPONENTIAL PARENT FUNCTIONS

- **F.IF.7.b.3** Knowledge of how parameters introduced into a function alter the shape of the graph of the parent function
- **F.BF.3.A** See the skills and knowledge that are stated in the Standard.

12. SEQUENCES

• SEQUENCES

- **F.IF.3.A** See the skills and knowledge that are stated in the Standard.
- **F.BF.1.a.1** See the skills and knowledge that are stated in the Standard.
- **F.LE.2.A** Ability to produce an algebraic model

• ARITHMETIC AND GEOMETRIC SEQUENCES

- **F.IF.2.A** Ability to make connections between context and algebraic representations which use function notation
- **F.IF.3.A** See the skills and knowledge that are stated in the Standard.
- **F.BF.1.a.1** See the skills and knowledge that are stated in the Standard.
- **F.LE.2.A** Ability to produce an algebraic model

13. STATISTICS

• DATA ANALYSIS

- **S.ID.1.A** Ability to determine the best data representation to use for a given situation
- **S.ID.1.B** Knowledge of key features of each plot
- **S.ID.1.C** Ability to correctly display given data in an appropriate plot
- **S.ID.1.D** Ability to analyze data given in different formats
- **S.ID.5.A** Knowledge of the characteristics of categorical data
- **S.ID.2.A** Ability to interpret measures of center and spread (variability) as they relate to several data sets
- **S.ID.2.B** Ability to identify shapes of distributions (skewed left or right, bell, uniform, symmetric)
- **S.ID.3.B** Ability to recognize extreme data points(outliers) and their impact on center
- **S.ID.3.C** Ability to effectively communicate what the data reveals
- **S.ID.3.D** Knowledge that when comparing distributions there must be common scales and units

- **FREQUENCY TABLES**

- **S.ID.5.B** Ability to read and use a two-way frequency table
- **S.ID.5.A** Knowledge of the characteristics of categorical data
- **S.ID.5.C** Ability to use and to compute joint, marginal, and conditional relative frequencies
- **S.ID.3.A** Ability to recognize gaps, clusters, and trends in the data set

14. TWO-VARIABLE DATA

- **SCATTERPLOTS**

- **S.ID.6.b.1** Ability to create a graphic display of residuals
- **S.ID.6.c.1** Ability to recognize a linear relationship displayed in a scatter plot
- **S.ID.6.b.4** Ability to analyze the meaning of patterns in residual plots
- **S.ID.9.A** Ability to provide examples of two variables that have a strong correlation but one does not cause the other
- **S.ID.6.a.2** Ability to create and use regression models to represent a contextual situation
- **S.ID.6.b.2** Ability to recognize patterns in residual plots
- **F.IF.6.B** Ability to identify the rate of change from multiple representations
- **F.LE.5.A** Ability to interpret the slope and y-intercept of a linear model in terms of context
- **S.ID.6.c.2** Ability to determine an equation for the line of best fit for a set of data points
- **S.ID.7.A** See the skills and knowledge that are stated in the Standard.

- **SCATTERPLOTS AND MODELING**

- **S.ID.6.a.2** Ability to identify which model is most appropriate; linear, exponential or quadratic
- **S.ID.6.b.1** Ability to create a graphic display of residuals
- **S.ID.6.c.2** Ability to determine an equation for the line of best fit for a set of data points
- **S.ID.1.B** Knowledge of key features of each plot
- **S.ID.3.A** Ability to recognize gaps, clusters, and trends in the data set
- **S.ID.6.b.3** Ability to calculate error margins (residuals) with a calculator
- **S.ID.6.b.4** Ability to analyze the meaning of patterns in residual plots
- **S.ID.6.b.2** Ability to recognize patterns in residual plots
- **S.ID.6.c.1** Ability to recognize a linear relationship displayed in a scatter plot
- **S.ID.8.B** Ability to compute and analyze the correlation coefficient for the purpose of communicating the goodness of fit of a linear model for a given data set
- **S.ID.6.a.1** Ability to fit a quadratic function to a set of data in a modeling context
- **S.ID.8.A** Knowledge of the range of the values ($-1 \leq r \leq 1$) and the interpretation of those values for correlation coefficients
- **S.ID.7.A** See the skills and knowledge that are stated in the Standard.
- **F.LE.5.B** Ability to identify the initial amount present in an exponential model ($f(0) = b^0 + k = 1 + k$)

15. REAL NUMBER SYSTEM

- **LAWS OF EXPONENTS**

- **A.SSE.2.A** Ability to use properties of mathematics to alter the structure of an expression

- **N.RN.2.A** Ability to use properties of radicals and rational exponents to transform and simplify radical expressions
- **A.REI.1.A** Ability to identify the mathematical property (addition property of equality, distributive property, etc.) used at each step in the solution process as a means of justifying a step

- **OPERATIONS ON RATIONAL AND IRRATIONAL NUMBERS**

- **N.RN.3.A** Ability to perform operations on both rational and irrational numbers
- **N.RN.3.B** Make generalizations about sums and products of rational and irrational numbers

16. POLYNOMIALS

- **POLYNOMIAL BASICS**

- **A.SSE.1.a.2** Ability to identify parts of an expression such as terms, factors, coefficients, etc.
- **A.SSE.1.a.1** Ability to make connections between symbolic representations and proper mathematics vocabulary

- **ADDITION AND SUBTRACTION OF POLYNOMIALS**

- **A.APR.1.A** Ability to show that when polynomials are added, subtracted or multiplied that the result is another polynomial

- **MULTIPLICATION OF POLYNOMIALS**

- **A.APR.1.A** Ability to show that when polynomials are added, subtracted or multiplied that the result is another polynomial

17. FACTORING POLYNOMIALS

- **FACTORING QUADRATIC TRINOMIALS**

- **A.SSE.1.a.2** Ability to identify parts of an expression such as terms, factors, coefficients, etc.
- **A.SSE.3.a.1** Ability to connect the factors, zeros and x-intercepts of a graph
- **A.REI.4.b.1** Ability to solve quadratic equations using various methods and recognize the most efficient method

- **FACTORING SPECIAL CASES**

- **A.SSE.1.a.2** Ability to identify parts of an expression such as terms, factors, coefficients, etc.
- **A.SSE.1.b.1** Ability to extend knowledge of A.SSE.1b from Unit 1 of this course to quadratic and exponential expressions
- **A.SSE.2.A** Ability to use properties of mathematics to alter the structure of an expression
- **A.SSE.2.B** Ability to select and then use an appropriate factoring technique
- **A.SSE.1.a.1** Ability to extend knowledge of A.SSE.1b from Unit 1 of this course to include quadratic and exponential expressions

- **FACTORING HIGHER-ORDER POLYNOMIALS**

- **A.SSE.1.a.2** Ability to identify parts of an expression such as terms, factors, coefficients, etc.
- **A.SSE.2.B** Ability to select and then use an appropriate factoring technique
- **A.APR.3.A** Ability to identify the zeros of a cubic polynomial of the form (linear factor)(factorable quadratic factor)

18. INTRODUCTION TO QUADRATIC FUNCTIONS

- **QUADRATIC FUNCTIONS**

- **A.SSE.1.a.1** Ability to extend knowledge of A.SSE.1b from Unit 1 of this course to include quadratic and exponential expressions
- **F.IF.4.B** Ability to connect appropriate function to context
- **A.REI.7.A** Knowledge of the algebraic and graphic representations of quadratic relations as well as quadratic functions
- **A.SSE.1.a.2** Ability to identify parts of an expression such as terms, factors, coefficients, etc.
- **F.IF.4.A** Ability to connect experiences with linear and exponential functions from Unit 2 of this course to quadratic, square root, cube root, absolute value, step and piecewise defined models.
- **F.BF.1.a.1** Ability to connect experience with linear and exponential functions from Unit 2 of this course to quadratic functions

● ANALYZING GRAPHS OF QUADRATIC FUNCTIONS

- **A.REI.11.A** Ability to show the equality of two functions using multiple representations
- **F.IF.9.A** Ability to connect experience with comparing linear and exponential functions from Unit 2 of this course to include quadratic functions
- **A.REI.7.A** Knowledge of the algebraic and graphic representations of quadratic relations as well as quadratic functions
- **F.IF.4.B** Ability to connect appropriate function to context
- **F.IF.9.B** Ability to recognize common attributes of a function from multiple representations
- **F.IF.8.a.2** Ability to recognize common attributes of a function from multiple representations
- **F.IF.1.B** Ability to identify the domain and range of a function from multiple representations
- **F.IF.5.A** Ability to connect experiences with linear and exponential functions from Unit 2 of this course to quadratic, square root, cube root, absolute value, step and piecewise defined models.
- **F.IF.5.B** Ability to describe the restrictions on the domain of a function based on real world context
- **F.IF.7.a.1** Ability to connect experience with graphing linear functions from Unit 2 of this course to include quadratic functions
- **F.BF.3.A** Ability to make generalizations about the changes that will result in the graph of any function as a result of making a particular change to the algebraic representation of the function
- **A.REI.10.A** Ability to construct an argument as to how the points that make up a curve connect to an algebraic representation of the function that is being represented by the graph
- **F.IF.4.A** Ability to connect experiences with linear and exponential functions from Unit 2 of this course to quadratic, square root, cube root, absolute value, step and piecewise defined models.
- **F.BF.1.a.1** Ability to connect experience with linear and exponential functions from Unit 2 of this course to quadratic functions
- **A.REI.4.b.1** Ability to solve quadratic equations using various methods and recognize the most efficient method
- **F.IF.5.C** Ability to recognize and use alternate vocabulary for domain and range such as input/output or independent/dependent
- **A.APR.3.A** Ability to identify the zeros of a cubic polynomial of the form (linear factor)(factorable quadratic factor)

● REPRESENTATIONS OF QUADRATIC FUNCTIONS

- **A.REI.11.A** Ability to show the equality of two functions using multiple representations
- **A.REI.7.A** Knowledge of the algebraic and graphic representations of quadratic relations as well as quadratic functions
- **F.IF.4.B** Ability to connect appropriate function to context
- **A.SSE.1.a.2** Ability to identify parts of an expression such as terms, factors, coefficients, etc.
- **F.IF.9.A** Ability to connect experience with comparing linear and exponential functions from Unit 2 of this course to include quadratic functions
- **A.SSE.2.B** Ability to select and then use an appropriate factoring technique
- **A.SSE.3.a.1** Ability to connect the factors, zeros and x-intercepts of a graph
- **A.SSE.3.b.1** Ability to recognize key features of a quadratic model given in vertex form
- **F.IF.4.A** Ability to connect experiences with linear and exponential functions from Unit 2 of this course to quadratic, square root, cube root, absolute value, step and piecewise defined models.
- **F.IF.5.A** Ability to connect experiences with linear and exponential functions from Unit 2 of this course to quadratic, square root, cube root, absolute value, step and piecewise defined models.
- **F.IF.7.b.3** Knowledge of how parameters introduced into a function alter the shape of the graph of the parent function
- **F.IF.8.a.1** Ability to make connections between different algebraic representations, a graph and a contextual model
- **F.IF.9.B** Ability to recognize common attributes of a function from multiple representations
- **F.IF.8.a.2** Ability to recognize common attributes of a function from multiple representations
- **F.BF.1.a.1** Ability to connect experience with linear and exponential functions from Unit 2 of this course to quadratic functions
- **F.BF.1.a.2** Ability to write the algebraic representation of a quadratic function from a contextual situation

19. SOLVING QUADRATIC FUNCTIONS

● SOLVING QUADRATIC EQUATIONS BY FACTORING

- **A.SSE.3.a.2** Ability to use the Zero-Product Property to solve quadratic equations
- **A.REI.4.b.1** Ability to solve quadratic equations using various methods and recognize the most efficient method
- **F.IF.4.B** Ability to connect appropriate function to context

- **F.IF.8.a.2** Ability to recognize common attributes of a function from multiple representations
- **A.APR.3.A** Ability to identify the zeros of a cubic polynomial of the form (linear factor)(factorable quadratic factor)
- **F.IF.7.a.1** Ability to connect experience with graphing linear functions from Unit 2 of this course to include quadratic functions
- **A.SSE.3.a.1** Ability to connect the factors, zeros and x-intercepts of a graph
- **A.REI.11.A** Ability to show the equality of two functions using multiple representations
- **A.REI.7.A** Knowledge of the algebraic and graphic representations of quadratic relations as well as quadratic functions
- **F.IF.9.A** Ability to connect experience with comparing linear and exponential functions from Unit 2 of this course to include quadratic functions
- **F.BF.1.a.1** Ability to connect experience with linear and exponential functions from Unit 2 of this course to quadratic functions

● **COMPLETING THE SQUARE**

- **A.REI.4.b.1** Ability to solve quadratic equations using various methods and recognize the most efficient method
- **A.REI.11.A** Ability to show the equality of two functions using multiple representations
- **F.IF.4.A** Ability to connect experiences with linear and exponential functions from Unit 2 of this course to quadratic, square root, cube root, absolute value, step and piecewise defined models.
- **A.SSE.3.b.1** Ability to recognize key features of a quadratic model given in vertex form
- **A.REI.7.A** Knowledge of the algebraic and graphic representations of quadratic relations as well as quadratic functions
- **F.IF.8.a.2** Ability to recognize common attributes of a function from multiple representations
- **F.IF.7.a.1** Ability to connect experience with graphing linear functions from Unit 2 of this course to include quadratic functions
- **F.IF.4.B** Ability to connect appropriate function to context
- **F.IF.9.A** Ability to connect experience with comparing linear and exponential functions from Unit 2 of this course to include quadratic functions

● **QUADRATIC FORMULA**

- **A.SSE.1.a.2** Ability to identify parts of an expression such as terms, factors, coefficients, etc.
- **A.SSE.1.a.1** Ability to extend knowledge of A.SSE.1b from Unit 1 of this course to include quadratic and exponential expressions
- **F.IF.4.B** Ability to connect appropriate function to context
- **A.REI.4.b.1** Ability to solve quadratic equations using various methods and recognize the most efficient method
- **A.REI.4.b.2** Ability to use the value of the discriminant to determine if a quadratic equation has one double solution, two unique solutions or no real solutions
- **A.REI.7.A** Knowledge of the algebraic and graphic representations of quadratic relations as well as quadratic functions
- **F.IF.9.A** Ability to connect experience with comparing linear and exponential functions from Unit 2 of this course to include quadratic functions
- **F.IF.8.a.2** Ability to recognize common attributes of a function from multiple representations
- **F.BF.1.a.1** Ability to connect experience with linear and exponential functions from Unit 2 of this course to quadratic functions

20. GRAPHS OF QUADRATIC FUNCTIONS

● **QUADRATIC PARENT FUNCTION**

- **F.IF.7.b.1** Ability to make a quick sketch of each parent function over the set of real numbers
- **F.IF.7.a.1** Ability to connect experience with graphing linear functions from Unit 2 of this course to include quadratic functions
- **F.IF.4.B** Ability to connect appropriate function to context
- **F.IF.5.A** Ability to connect experiences with linear and exponential functions from Unit 2 of this course to quadratic, square root, cube root, absolute value, step and piecewise defined models.
- **F.IF.5.B** Ability to describe the restrictions on the domain of a function based on real world context
- **F.IF.5.C** Ability to recognize and use alternate vocabulary for domain and range such as input/output or independent/dependent
- **F.IF.7.b.3** Knowledge of how parameters introduced into a function alter the shape of the graph of the parent function

● **TRANSFORMATIONS OF THE QUADRATIC PARENT FUNCTION**

- **F.IF.7.b.3** Knowledge of how parameters introduced into a function alter the shape of the graph of the parent function
- **A.REI.7.A** Knowledge of the algebraic and graphic representations of quadratic relations as well as quadratic functions

- **F.BF.3.A** Ability to make generalizations about the changes that will result in the graph of any function as a result of making a particular change to the algebraic representation of the function
- **F.IF.5.A** Ability to connect experiences with linear and exponential functions from Unit 2 of this course to quadratic, square root, cube root, absolute value, step and piecewise defined models.

21. NONLINEAR FUNCTIONS AND EQUATIONS

● LINEAR VERSUS NONLINEAR FUNCTIONS

- **F.IF.6.B** Ability to identify the rate of change from multiple representations
- **F.LE.1.b.1** Ability to recognize a linear relationship
- **F.LE.1.c.1** Ability to recognize an exponential relationship
- **F.LE.3.A** Ability to recognize linear, quadratic and exponential relationships
- **F.LE.5.C** Ability to interpret the rate of increase/decrease in an exponential model
- **F.IF.1.B** Ability to identify the domain and range of a function from multiple representations
- **F.LE.1.a.1** See the skills and knowledge that are stated in the Standard.
- **F.LE.2.A** Ability to produce an algebraic model
- **F.IF.4.A** Ability to translate from algebraic representations to graphic or numeric representations and identify key features using the various representations
- **F.IF.9.A** Ability to recognize common attributes of a function from various representations

● SYSTEMS OF NONLINEAR EQUATIONS

- **A.REI.11.A** Ability to show the equality of two functions using multiple representations
- **F.IF.4.B** Ability to connect appropriate function to context

22. WORKING WITH FUNCTIONS

● ABSOLUTE VALUE FUNCTIONS

- **F.IF.5.A** Ability to connect experiences with linear and exponential functions from Unit 2 of this course to quadratic, square root, cube root, absolute value, step and piecewise defined models.
- **F.IF.5.B** Ability to describe the restrictions on the domain of a function based on real world context
- **F.IF.4.B** Ability to connect appropriate function to context
- **F.IF.7.b.2** Ability to make connections between a function's domain and range and the appearance of the graph of the function
- **F.IF.4.A** Ability to connect experiences with linear and exponential functions from Unit 2 of this course to quadratic, square root, cube root, absolute value, step and piecewise defined models.
- **F.IF.7.b.1** Ability to make a quick sketch of each parent function over the set of real numbers

● MULTIPLE REPRESENTATIONS OF FUNCTIONS

- **A.CED.2.B** Ability to determine unknown parameters needed to create an equation that accurately models a given situation
- **A.REI.11.A** Ability to show the equality of two functions using multiple representations
- **F.IF.4.A** Ability to translate from algebraic representations to graphic or numeric representations and identify key features using the various representations
- **F.IF.9.A** Ability to connect experience with comparing linear and exponential functions from Unit 2 of this course to include quadratic functions
- **F.LE.2.A** Ability to produce an algebraic model
- **A.CED.2.A** Ability to distinguish between linear, quadratic and exponential relationships given numeric, or verbal representations
- **F.IF.9.B** Ability to recognize common attributes of a function from multiple representations
- **A.REI.7.A** Knowledge of the algebraic and graphic representations of quadratic relations as well as quadratic functions
- **F.IF.4.B** Ability to connect appropriate function to context
- **F.IF.8.a.2** Ability to recognize common attributes of a function from multiple representations
- **F.LE.5.B** Ability to identify the initial amount present in an exponential model ($f(0) = b^0 + k = 1 + k$)

