Algebra 1

Unit 1: Relationships Between Quantities and Reasoning with Equations		
Each objective is not necessarily a discrete lesson. Many objectives will overlap with other objectives or recur throughout the course. Throughout the course, students develop and strengthen their logic and reasoning, problem-solving, computation, and communication skills while making connections to the real world. The recommended times include instruction, practice, review and assessment.		
Alaska Standard	**Student Outcome for Mastery**	**Time**
N.Q.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.	Label units through multiple steps of a problem. Choose appropriate units for real-world problems involving formulas. Use and interpret units when solving formulas. Choose an appropriate scale and origin for graphs and data displays. Interpret the scale and origin for scale and data displays.	
N.Q.2 Define appropriate quantities for the purpose of descriptive modeling.	Use dimensional analysis to answer problems with the correct units within a problems solving situation. Able to apply units when using formulas.	
N.Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	In multi-step problems that require rounding at the end, students should understand that answers are kept as accurate as possible until the very end of the solution and are not rounded at each step. Students should be able to answer the question: To what degree of accuracy are we confident of our solutions? Report measured quantities in a way that is reasonable for the tool used to make the measurement (e.g. 5.1cm is a reasonable way to report length measured on a typical ruler, but 5.1476 is not. If time is measured on a stopwatch, 1:23:45.78 is a reasonable way to report time; it is not appropriate if time is measured on a wall clock.) Report calculated using the same level of accuracy as used in the problem statement.	
A.SSE.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.	Define expression, term, factor, and coefficient. Interpret real-world meaning of the terms, factors, and coefficients of an expression in terms of their units. Group parts of an expression differently in order to better interpret their meaning.	
A.CED.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 and exponential functions.	Communicate and construct responses based on properties of rational and exponential functions or reasoning of linear or quadratic growth. *(Rational functions are addressed in Algebra 2 and quadratic functions are addressed in a later unit)*	

A.CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	Identify the variables and quantities represented in a real-world problem. Determine the best model for the real-world problem (e.g. linear, quadratic). Write the equation that best models the problem. Set up coordinate axes using an appropriate scale and label the axes. Graph equations on coordinate axes with appropriate labels and scales.	
A.CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.	Recognize mistakes in their solutions or calculator errors when their answers are beyond the realm of possibility. Model real-world situations algebraically and determine the appropriate domain and range for the problem	
A.CED.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.	Transpose a formula for other variables within the formula with the ability to appropriately explain their reasoning in written or oral form.	
A.REI.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.	Solve problems using a logical progression of steps or a chain or reasoning with appropriate justification using appropriate grade-level vocabulary, symbols and labels	
A.REI.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.	Use the properties of equality and inequality to solve linear equations and inequalities in one variable. Solve literal equations for a specific variable when the coefficients are letters instead of numbers.	

Unit 2: Linear and Exponential Relationships

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Alaska Standard	Student Outcome for Mastery	Time
N.RN.1 Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. For example, we define $5^{\frac{1}{3}}$ to be the cube root of 5 because we want $\left(5^{1/3}\right)^3 = 5^{(1/3)(3)}$ to hold, so $\left(5^{1/3}\right)^3 = 5$.	Understand the relationship between square roots, cube roots, and exponents. *Example:* $\sqrt{81}$ *is 9 because* 9^2 *is 81* Convert between radical form and rational exponents. Communicate the reasoning for using a specific form.	
N.RN.2 Rewrite expressions involving radicals and rational exponents using the properties of exponents.	Use properties of exponents to simplify radicals and rational exponents. *Example:* $9^2 \bullet \sqrt{81} = 9^3$ Communicate what makes an expression rational versus irrational.	
A.REI.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.	Solve systems of linear equations through substitution or elimination.	
A.REI.6 Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.	Solve systems of linear equations through constructing tables of values and graphing.	
A.REI.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).	Understand that all points on the graph of a two variable equation are solutions. *Example: Show that in y = 2x + 2 that (2,6) is on the graph using substitution*.	
A.REI.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.	Show that $y = f(x)$ and $y = g(x)$ are solutions of the equation $f(x) = g(x)$ through graphing, tables of values, or through substitution. *Example:* *Show by substitution that y = 2x + 2 [y = (f)x] and y = -4x + 2 [y=(g)x] is 2x +2 = -4x + 2.*	

A.REI.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.	Graph various systems of linear inequalities, determine if the boundary line is dashed or solid, and recognize the shaded part is the solutions to the linear inequality. *Example: Graph* $y < 2x + 5$	
F.IF.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)."	Determine if a pattern is a function using a table of values, graphs, the vertical line test to show that each "x" has only one distinct value for "y".	
F.IF.2 Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.	Determine the output of a function given a function rule and the input value in linear and exponential situations. *Example: Evaluate F(x) = 2x + 5 where "x" equals 4 leads to F(4) = 13*	
F.IF.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.	Find patterns described in terms of the prior number in a sequence. This includes arithmetic sequences, geometric sequences (exponential), and Fibonacci sequences.	
F.IF.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.	Identify key features of graph or tables (intercepts of "x" and "y", the vertex, rate of change) Identify functions that are increasing, decreasing, positive, negative, find relative maximums/minimums, and periods when given a graph or a table of values. Understand the key features in the context of the problem. *Example: What does the y-intercept, x-intercept (s), or rate of change mean in the context of the problem?*	
F.IF.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 n engines in a factory, then the positive integers would be an appropriate domain for the function.	Identify the appropriate domain of linear and exponential functions from a graph based on a context. Establish restrictions on the domain for linear and exponential functions. Identify the meaning of a point in terms of the context.	
F.IF.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. ★	Calculate the rate of change for linear and exponential functions, limiting the domain to a subset of the integers. Understand the meaning of positive, negative, and zero rates of change. Estimate the rate of change from a graph of linear and exponential functions. Identify the rate of change from multiple representations.	

F.IF.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. **e.** Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.	Graph simple linear and exponential functions by hand, identifying key elements of the graph such as slope, y-intercept, rate of growth or decay. Graph more complicated functions using technology.	
F.IF.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 $y = 1.02^t$, $y = .97^t$, $y = 1.01^{12t}$, $y = 1.2^{t/10}$, and classify them as representing exponential growth or decay.	Distinguish between exponential functions that model exponential growth and exponential decay. Interpret the components of an exponential function in the context of the problem *(e.g.* $y=5\cdot 1.225^{t/3}$ *describes that was initially 5 and increases 22.5% every three years.)* Use the properties of exponents to rewrite an exponential function to emphasize one of its properties *For example* $y=5\cdot 1.225^{t/3}\approx 5\cdot 1.07^{t}$*, which means that increasing 22.5% every three years is about the same as increasing 7% per year.)* *This standard is only partially addressed in this unit*.	
F.IF.9 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.	Compare the key attributes of two linear or exponential functions that are represented by verbal descriptions, tables, graphs, and equations.	
F.BF.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.	Write linear and exponential functions that describe the relationships between two quantities. Create a function to model a relationship between two quantities. Add, subtract, multiply, and divide linear and exponential functions. Determine that a value of x that will give a specific value of y.	

F.BF.2 Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.	Write the recursive and explicit forms of arithmetic and geometric sequences, translate between the recursive and explicit forms, and use the recursive and explicit forms to model real-world situations. Connect arithmetic sequences to linear functions and geometric sequences to exponential functions.	
F.BF.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.	Understand that adding a constant, k, to a linear and exponential function moves the graph vertically. *This standard is only partially addressed in this unit.*	
F.LE.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.	Classify situations as linear or exponential based on the change between intervals. Recognize that linear functions change by equal differences and that exponential functions change by equal factors.	
F.LE.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).	Identify the rate of change and the initial value (y- intercept) from the arithmetic or geometric sequences, recursive (NOW-NEXT) statements, tables, graphs, or verbal descriptions and write a linear or exponential function. Understand that the function represents the relationship between the x- and the y-value. Math operations are performed with the x-value to give the y-value.	
F.LE.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.	Evaluate graphs and tables and understand that a quantity increasing exponentially eventually exceeds a quantity increasing linearly or quadratically.	
F.LE.5 Interpret the parameters in a linear or exponential function in terms of a context.	Understand the difference between practical and non-practical values of the domain in linear and exponential situations and explain their meaning in terms of context.	

Unit 3: Descriptive Statistics

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Alaska Standard	Student Outcome for Mastery	Time
S.ID.1 Represent data with plots on the real number line (dot plots, histograms, and box plots).	Ability to choose an appropriate plot for data in a given situation and correctly display onto a number line.	
S.ID.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	Understand that different statistics fit with different data distribution. i.e. mean & standard deviation with normal distribution and median & interquartile range with skewed data. Calculate statistics appropriate to different data sets.	
S.ID.3 Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).	Analyze data through its shape, center, and spread in a given context accounting for outliers.	
S.ID.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.	Understand the difference between categorical and quantitative data. Ability to understand and create two way frequency tables for categorical data. Calculate and interpret relative frequencies including joint, marginal and conditional relative frequencies. Recognize possible associations and trends in the data.	
S.ID.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.	Represent data for two quantitative variables on a scatter plot. Identify appropriate function to fit to the data (focus on linear and quadratic) Fit a function to the data and use it to solve problems in the context of the data. Informally assess the fit of a function by plotting and analyzing residuals.	
S.ID.7 Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.	Interpret the meaning of the slope in terms of the units stated in the data. (R) Interpret the meaning of the y-intercept in terms of the units stated in the data. (R)	
S.ID.8 Compute (using technology) and interpret the correlation coefficient of a linear fit.	Calculate the correlation coefficient and communicate the meaning of the r value in the range of -1 to 1.	

S.ID.9 Distinguish between correlation and causation.	Understand the difference between correlation (when two things relate to each other) and causation (when one thing causes the other). *Example: TV sales in a city may correlate to computer sales (both rise) but they do not cause the computer sales.* Recognize that correlation does not imply causation and that causation is not illustrated on a scatter plot. Choose two variables that could be correlated because one is the cause of the other and defend the selection. Choose two variables that could be correlated even though neither variable could reasonably be considered to be the cause of the other and defend the selection. Determine and defend whether statements of causation seem reasonable or unreasonable.	

Unit 4: Expressions and Equations

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Alaska Standard	Student Outcome for Mastery	Time
A.SSE.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.	Identify, manipulate, and interpret the meaning of different parts of expressions (i.e. terms, factors, coefficients, etc.) within the context of a problem. At this level, limit to linear expressions, exponential expressions with integer exponents, and quadratic expressions. Analyze parts of an expression to reveal the underlying structure and explain the meaning of the individual parts. *For example consider* $5000(1.025)^4$. *This expression can be viewed as the product of 5,000 and 1.025 raised to the 4th power. 5000 could represent the initial amount of money I have invested in an account. The exponent tells me that I have invested this amount of money for four years. The base of 1.025 can be written as (1 + 0.025), revealing the growth rate of 2.5% per year.*	
A.SSE.2 Use the structure of an expression to identify ways to rewrite it. For example, see $x^4 - y^4 = (x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.	Write algebraic expressions in different equivalent forms by using an appropriate factoring technique and apply it to alter the structure of an expression. Use the properties of algebra to simplify expressions; including combining like terms and performing other operations with polynomials.	
A.SSE.3 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. **a.** Factor a quadratic expression to reveal the zeros of the function it defines. **b.** Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. **c.** Use the properties of exponents to transform expressions for exponential functions. For example the expression 1.15^t can be rewritten as $(1.15^{1/12})^{12t} \approx 1.012^{12t}$ to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.	Write expressions in equivalent forms by factoring to find the zeros of a quadratic function and explain the meaning of the zeros. Demonstrate connections between factors, zeros, and x-intercepts of a graph. Write expressions in equivalent forms by completing the square to convey the vertex form of a quadratic and recognize the key features of a quadratic model. Find the maximum or minimum value of a quadratic function, and to explain the meaning of the vertex. Use the properties of exponents to write an equivalent form of an exponential function to reveal and explain specific information about its approximate rate of growth or decay. Demonstrate ability to connect experience with properties of exponents from Unit 2 of this course to more complex expressions.	

A.APR.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.	Demonstrate their understanding of the definition of a polynomial, the concepts of combining like terms and how closure applies to the operations of addition, subtraction and multiplication	
A.CED.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 and exponential functions.	Write linear, quadratic, rational and exponential equations and inequalities in one variable to model a contextual situation and solve a problem. Define the variable and use appropriate units. (Note: The focus for this standard is writing the equations and inequalities; A-REI.1 and A-REI.3 focus on solution methods)	
A.CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	Create equations in two or more variables to represent relationships between quantities, and graph the equations in two variables on a coordinate plane and label the axes and scales.	
A.CED.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.	Solve multi-variable formulas or literal equations for a specific variable. Able to recognize and create different forms of literal equations.	
A.REI.4 Solve quadratic equations in one variable. **a.** Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x-p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form. **b.** Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as a ± bi for real numbers a and b.	Transform a quadratic equation written in standard form to an equation in vertex form by completing the square. Derive the quadratic formula by completing the square on a standard form of a quadratic equation. Solve a quadratic equation in one variable by using the Square Root Property, factoring, or completing the square, and will be able to recognize when to use the most efficient method. Use the quadratic formula to solve any quadratic equation, recognizing that the formula produces all complex solutions, and will write the solutions in the form a + bi and a-bi, where a and b are real numbers. Explain how complex solutions affect the graph of a quadratic equation. 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 Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line y = –3x and the circle $x^2 + y^2 = 3$.	Solve a system containing a linear equation and a quadratic equation in two variables (possibly conic sections) both graphically and algebraically.	

Unit 5: Quadratic Functions and Modeling

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Alaska Standard	Student Outcome for Mastery	Time
N.RN.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.	Understand and communicate how operations effect rational and irrational numbers.	
F.IF.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.	Given a Quadratic function, identify key features in graphs and tables including: intercepts, intervals where the function is increasing, decreasing, positive, or negative; maximum and minimum values, symmetries; end behavior.	
F.IF.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 n engines in a factory, then the positive integers would be an appropriate domain for the function.	Ability to describe the restrictions on the domain of a quadratic function based on authentic (real-world) context.	
F.IF.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.	Given a variety of functions (i.e., abs value, quadratic, linear, square root, step function, cubic, cube root) describe the slope pattern of parent function.	
F.IF.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.	Graph linear and quadratic functions and show intercepts, maxima, and minima. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions	

F.IF.8 Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. **a.** Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. **b**. Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)^{12t}$, $y = (1.2)^{t/10}$, and classify them as representing exponential growth or decay.	Write quadratic functions in factored form, standard form and vertex form and understand the usefulness of each form. Convert between different forms of quadratic functions. **F.IF.8b should be represented in Unit 2**	
F.IF.9 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.	Convert between multiple representations(table, graph, equation/function notation) of quadratic, linear and exponential functions to compare key attributes	
F.BF.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.	Write a quadratic function from a contextual situation. Perform operations between two functions and explain how the operation affects the functions in context.	
F.BF.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.	Perform transformations on parent graphs (line, quadratics, absolute value, cubics, step functions, exponential functions). Explain how the transformation affects the parent function (moves up/down/right/left/shrinks/stretches/flips). *For example: explain why f(kx) horizontally stretches or shrinks the graph of f(x) by a factor of 1/k and predict whether a given value of k will cause a stretch or shrink.*	
F.BF.4 Find inverse functions. a. Solve an equation of the form f(x) = c for a simple function f that has an inverse and write an expression for the inverse. For example, f(x) = 2 x3 or f(x) = (x+1)/(x-1) for $x \neq 1$.	Calculate the inverse of a function Determine if the inverse is a function Create an inverse from a graph or a table.	
F.LE.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.	Make a connection that a rate of change for an exponential function will eventually exceed the rate of change for a linear, quadratic, or polynomial graph.	