

Algebra I

Number and Quantity

The Real Number System (N-RN)

Extend the properties of exponents to rational exponents

		Algebra Nation Section	Algebra Nation Topic
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 $\left(5^{\frac{1}{3}}\right)^3 = (5)^{\frac{1}{3} \times 3}$ to hold, so $\left(5^{\frac{1}{3}}\right)^3$ must equal 5.	Section 1 Expressions	Topic 6 Radical Expressions and Expressions with Rational Exponents
N-RN.2	Rewrite expressions involving radicals and rational exponents using the properties of exponents.	Section 1 Expressions	Topic 5 Properties of Exponents
		Section 1 Expressions	Topic 6 Radical Expressions and Expressions with Rational Exponents
		Section 1 Expressions	Topic 7 Adding Expressions with Radicals and Rational Exponents
		Section 1 Expressions	Topic 8 More Operations with Radicals and Rational Exponents
Use properties of rational and irrational numbers			
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.	Section 1 Expressions	Topic 10 Operations with Rational and Irrational Numbers

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Quantities (N-Q) *

Reason quantitatively and use units to solve problems

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.	Section 1 Expressions	Topic 1 Using Expressions to Represent Real World Situations
		Section 4 Linear Functions	Topic 9 Solution Sets to Inequalities with Two Variables
N-Q.2	Define appropriate quantities for the purpose of descriptive modeling.	Section 4 Linear Functions	Topic 3 Interpreting Rate of Change and y-Intercept in a Real-World Context – Part 1
		Section 6 Quadratic Functions – Part 2	Topic 3 Graphing Quadratics Using a Table

The Complex Number System (N-CN)

Perform arithmetic operations with complex numbers

N-CN.1	Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ with a and b real.	Section 1 Expressions	Topic 9 Complex Numbers
N-CN.7	Solve quadratic equations with real coefficients that have complex solutions.	Section 6 Quadratic Functions – Part 2	Topic 2 Nature of the Solutions of Quadratics

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Seeing Structure in Expressions (A-SSE)

Interpret the structure of expressions

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.	Section 1 Expressions	Topic 1 Using Expressions to Represent Real World Situations
		Section 6 Quadratic Functions – Part 2	Topic 5 Graphing Quadratics Using Vertex Form – Part 1
A-SSE.2	Use the structure of an expression to identify ways to rewrite it. For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.	Section 5 Quadratic Functions – Part 1	Topic 5 Solving Quadratics by Factoring – Special Cases
		Section 5 Quadratic Functions – Part 1	Topic 6 Solving Quadratics by Taking Square Roots
		Section 5 Quadratic Functions – Part 1	Topic 7 Solving Quadratics by Completing the Square

Write expressions in equivalent forms to solve problems

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 $\left(1.15^{\frac{1}{12}}\right) 12^t \approx 1.012^{12t}$ to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.	Section 5 Quadratic Functions – Part 1	Topic 2 Factoring Quadratic Expressions
		Section 5 Quadratic Functions – Part 1	Topic 3 Solving Quadratics by Factoring
		Section 5 Quadratic Functions – Part 1	Topic 4 Solving Other Quadratics by Factoring
		Section 5 Quadratic Functions – Part 1	Topic 5 Solving Quadratics by Factoring – Special Cases
		Section 5 Quadratic Functions – Part 1	Topic 7 Solving Quadratics by Completing the Square
		Section 5 Quadratic Functions – Part 1	Topic 8 Deriving the Quadratic Formula
		Section 5 Quadratic Functions – Part 1	Topic 10 Quadratics in Action
		Section 7 Exponential Functions	Topic 5 Graphs of Exponential Functions – Part 2

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Arithmetic with Polynomials and Rational Expressions (A-APR)			
Perform arithmetic operations on polynomials			
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.	Section 1 Expressions	Topic 1 Using Expressions to Represent Real World Situations
		Section 3 Introduction to Functions	Topic 3 Adding and Subtracting Functions
		Section 3 Introduction to Functions	Topic 4 Multiplying Functions
		Section 3 Introduction to Functions	Topic 6 Closure Property
Creating Equations (A-CED) *			
Create equations that describe numbers or relationships			
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.	Section 2 Equations	Topic 3 Solving Equations
		Section 2 Equations	Topic 5 Solving Power Functions
		Section 2 Equations	Topic 7 Solving Inequalities – Part 2
		Section 2 Equations	Topic 9 Solving Absolute Value Equations and Inequalities
A-CED.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	Section 2 Equations	Topic 11 Solution Sets to Equations with Two Variables
		Section 4 Linear Functions	Topic 3 Interpreting Rate of Change and y-Intercept in a Real-World Context – Part 1
		Section 6 Quadratic Functions – Part 2	Topic 1 Observations from the Graph of a Quadratic Function

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A-CED.3	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.	Section 4 Linear Functions	Topic 6 Finding Solution Sets to Systems of Equations Using Substitution and Graphing
		Section 4 Linear Functions	Topic 9 Solution Sets to Inequalities with Two Variables
		Section 4 Linear Functions	Topic 10 Finding Solution Sets to Systems of Linear Inequalities
		Section 5 Quadratic Functions – Part 1	Topic 1 Real-World Examples of Quadratic Functions
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 .	Section 2 Equations	Topic 10 Rearranging Formulas
Reasoning with Equations and Inequalities (A-REI)			
Understand solving equations as a process of reasoning and explain the reasoning			
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.	Section 2 Equations	Topic 2 Identifying Properties When Solving Equations
		Section 2 Equations	Topic 3 Solving Equations
A-REI.2	Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.	Section 2 Equations	Topic 5 Solving Power Functions
Solve equations and inequalities in one variable			
A-REI.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.	Section 2 Equations	Topic 1 Equations: True or False?
		Section 2 Equations	Topic 2 Identifying Properties when Solving Equations
		Section 2 Equations	Topic 3 Solving Equations
		Section 2 Equations	Topic 6 Solving Inequalities – Part 1
		Section 2 Equations	Topic 7 Solving Inequalities – Part 2

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A-REI.3 (cont.)	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.	Section 2 Equations	Topic 9 Solving Absolute Value Equations and Inequalities
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 $a \pm bi$ for real numbers a and b .	Section 5 Quadratic Functions – Part 1	Topic 3 Solving Quadratics by Factoring
		Section 5 Quadratic Functions – Part 1	Topic 4 Solving Other Quadratics by Factoring
		Section 5 Quadratic Functions – Part 1	Topic 5 Solving Quadratics by Factoring – Special Cases
		Section 5 Quadratic Functions – Part 1	Topic 6 Solving Quadratics by Taking Square Roots
		Section 5 Quadratic Functions – Part 1	Topic 7 Solving Quadratics by Completing the Square
		Section 5 Quadratic Functions – Part 1	Topic 8 Deriving the Quadratic Formula
		Section 5 Quadratic Functions – Part 1	Topic 9 Solving Quadratics Using the Quadratic Formula
		Section 5 Quadratic Functions – Part 1	Topic 10 Quadratics in Action
		Section 6 Quadratic Functions – Part 2	Topic 2 Nature of the Solutions of Quadratics

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Solve systems of equations			
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.	Section 4 Linear Functions	Topic 7 Using Equivalent Systems of Equations
A-REI.6	Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.	Section 4 Linear Functions	Topic 5 Introduction to Systems of Equations
		Section 4 Linear Functions	Topic 6 Finding Solution Sets to Systems of Equations Using Substitution and Graphing
		Section 4 Linear Functions	Topic 7 Using Equivalent Systems of Equations
		Section 4 Linear Functions	Topic 8 Finding Solution Sets to Systems of Equations Using Elimination
Represent and solve equations and inequalities graphically			
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).	Section 2 Equations	Topic 11 Solution Sets to Equations with Two Variables
		Section 4 Linear Functions	Topic 4 Interpreting Rate of Change and y-Intercept in a Real-World Context – Part 2
		Section 4 Linear Functions	Topic 6 Finding Solution Sets to Systems of Equations Using Substitution and Graphing
		Section 8 Piecewise and Power Functions	Topic 3 Absolute Value Functions
		Section 8 Piecewise and Power Functions	Topic 4 Graphing Power Functions – Part 1
		Section 8 Piecewise and Power Functions	Topic 5 Graphing Power Functions – Part 2

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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.	Section 4 Linear Functions	Topic 5 Introduction to Systems of Equations
		Section 4 Linear Functions	Topic 6 Finding Solution Sets to Systems of Equations Using Substitution and Graphing
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.	Section 4 Linear Functions	Topic 9 Solution Sets to Inequalities with Two Variables
		Section 4 Linear Functions	Topic 10 Finding Solution Sets to Systems of Linear Inequalities

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Functions

Interpreting Functions (F-IF)

Understand the concept of a function and use function notation

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 $y = f(x)$.	Section 3 Introduction to Functions	Topic 1 Input and Output Values
		Section 3 Introduction to Functions	Topic 2 Representing, Naming, and Evaluating Functions
		Section 3 Introduction to Functions	Topic 8 Key Functions of Graphs of Functions – Part 1
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.	Section 3 Introduction to Functions	Topic 1 Input and Output Values
		Section 3 Introduction to Functions	Topic 2 Representing, Naming, and Evaluating Functions
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 $n \geq 1$.	Section 4 Linear Functions	Topic 1 Arithmetic Sequences
		Section 7 Exponential Functions	Topic 1 Geometric Sequences
		Section 7 Exponential Functions	Topic 2 Comparing Arithmetic and Geometric Sequences

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Interpret functions that arise in applications in terms of the context			
F-IF.4	<p>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.</p>	Section 3 Introduction to Functions	Topic 8 Key Features of Graphs of Functions–Part 1
		Section 3 Introduction to Functions	Topic 9 Key Features of Graphs of Functions–Part 2
		Section 4 Linear Functions	Topic 3 Interpreting Rate of Change and y-Intercept in a Real-World Context – Part 1
		Section 5 Quadratic Functions – Part 1	Topic 1 Real-World Examples of Quadratic Functions
		Section 6 Quadratic Functions – Part 2	Topic 1 Observations from the Graph of a Quadratic Function
		Section 7 Exponential Functions	Topic 4 Graphs of Exponential Functions–Part 1
		Section 7 Exponential Functions	Topic 5 Graphs of Exponential Functions–Part 2
		Section 7 Exponential Functions	Topic 7 Comparing Linear, Quadratic, and Exponential Functions–Part 1
		Section 7 Exponential Functions	Topic 8 Comparing Linear, Quadratic, and Exponential Functions–Part 2
F-IF.5	<p>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.</p>	Section 3 Introduction to Functions	Topic 2 Representing, Naming, and Evaluating Functions
		Section 6 Quadratic Functions – Part 2	Topic 1 Observations from the Graph of a Quadratic Function
		Section 7 Exponential Functions	Topic 7 Comparing Linear, Quadratic, and Exponential Functions – Part 1

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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.	Section 4 Linear Functions	Topic 2 Rate of Change of Linear Functions
		Section 4 Linear Functions	Topic 3 Interpreting Rate of Change and y-Intercept in a Real World Context – Part 1
		Section 4 Linear Functions	Topic 4 Interpreting Rate of Change and y-Intercept in a Real World Context – Part 2
		Section 7 Exponential Functions	Topic 7 Comparing Linear, Quadratic, and Exponential Functions–Part 1
		Section 7 Exponential Functions	Topic 8 Comparing Linear, Quadratic, and Exponential Functions–Part 2
Analyze functions using different 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. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.	Section 3 Introduction to Functions	Topic 7 Families of Functions
		Section 4 Linear Functions	Topic 3 Interpreting Rate of Change and y-Intercept in a Real-World Context – Part 1
		Section 6 Quadratic Functions – Part 2	Topic 3 Graphing Quadratics Using a Table
		Section 6 Quadratic Functions – Part 2	Topic 4 Graphing Quadratics Using the Vertex and Intercepts
		Section 6 Quadratic Functions – Part 2	Topic 5 Graphing Quadratics Using Vertex Form – Part 1
		Section 6 Quadratic Functions – Part 2	Topic 6 Graphing Quadratics Using Vertex Form – Part 2

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F-IF.7 (cont).	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.	Section 8 Piecewise and Power Functions	Topic 1 Understanding Piecewise-Defined Functions
		Section 8 Piecewise and Power Functions	Topic 3 Absolute Value Functions
		Section 8 Piecewise and Power Functions	Topic 4 Graphing Power Functions – Part 1
		Section 8 Piecewise and Power Functions	Topic 5 Graphing Power Functions – Part 2
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 $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)^{12t}$, $y = (1.2)^{\frac{t}{10}}$, and classify them as representing exponential growth or decay.	Section 5 Quadratic Functions – Part 1	Topic 10 Quadratics in Action
		Section 6 Quadratic Functions – Part 2	Topic 1 Observations from the Graph of a Quadratic Function
		Section 6 Quadratic Functions – Part 2	Topic 4 Graphing Quadratics Using the Vertex and Intercepts
		Section 6 Quadratic Functions – Part 2	Topic 5 Graphing Quadratics Using Vertex Form – Part 1
		Section 7 Exponential Functions	Topic 6 Growth and Decay Rates of Exponential Functions
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.	Section 6 Quadratic Functions – Part 2	Topic 6 Graphing Quadratics Using Vertex Form – Part 2

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Building Functions (F-BF)

Build a function that models a relationship between two quantities

F-BF.1	<p>Write a function that describes a relationship between two quantities.</p> <p>a. Determine an explicit expression, a recursive process, or steps for calculation from a context.</p> <p>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.</p> <p>c. Compose functions. For example, if $T(y)$ is the temperature in the atmosphere as a function of height, and $h(t)$ is the height of a weather balloon as a function of time, then $T(h(t))$ is the temperature at the location of the weather balloon as a function of time.</p>	Section 4 Linear Functions	Topic 1 Arithmetic Sequences
		Section 8 Piecewise and Power Functions	Topic 1 Understanding Piecewise-Defined Functions
F-BF.2	<p>Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.</p>	Section 4 Linear Functions	Topic 1 Arithmetic Sequences
		Section 7 Exponential Functions	Topic 1 Geometric Sequences
Build new functions from existing functions			
F-BF.3	<p>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. <i>Include recognizing even and odd functions from their graphs and algebraic expressions for them.</i></p>	Section 3 Introduction to Functions	Topic 11 Transformations of Functions
		Section 6 Quadratic Functions – Part 2	Topic 7 Transformations of the Dependent Variable of Quadratic Functions
		Section 6 Quadratic Functions – Part 2	Topic 8 Transformations of the Independent Variable of Quadratic Functions

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F-BF.4	<p>Find inverse functions.</p> <p>a. Solve an equation of the form $f(x) = c$ for a simple function f that has an inverse and write an expression for the inverse. For example, $f(x) = 2(x^3)$ or $f(x) = \frac{(x+1)}{(x-1)}$ for $x \neq 1$.</p> <p>b. Verify by composition that one function is the inverse of another.</p> <p>c. Read values of an inverse function from a graph or a table, given that the function has an inverse.</p> <p>d. Produce an invertible function from a non-invertible function by restricting the domain.</p>	<p>Section 3 Introduction to Functions</p>	<p>Topic 10 Inverse Functions</p>
Linear, Quadratic, and Exponential Models (F-LE) *			
Construct and compare linear, quadratic, and exponential models and solve problems			
F-LE.1	<p>Distinguish between situations that can be modeled with linear functions and with exponential functions.</p> <p>a. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.</p> <p>b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.</p> <p>c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.</p>	<p>Section 7 Exponential Functions</p>	<p>Topic 2 Comparing Arithmetic and Geometric Sequences</p>
		<p>Section 7 Exponential Functions</p>	<p>Topic 7 Comparing Linear, Quadratic, and Exponential Functions–Part 1</p>
		<p>Section 7 Exponential Functions</p>	<p>Topic 8 Comparing Linear, Quadratic, and Exponential Functions–Part 2</p>

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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).	Section 7 Exponential Functions	Topic 2 Comparing Arithmetic and Geometric Sequences
		Section 7 Exponential Functions	Topic 3 Exponential Functions
		Section 7 Exponential Functions	Topic 4 Graphs of Exponential Functions – Part 1
		Section 7 Exponential Functions	Topic 5 Graphs of Exponential Functions – Part 2
		Section 7 Exponential Functions	Topic 6 Growth and Decay Rates of Exponential Functions
		Section 7 Exponential Functions	Topic 7 Comparing Linear, Quadratic, and Exponential Functions – Part 1
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.	Section 7 Exponential Functions	Topic 2 Comparing Arithmetic and Geometric Sequences
Interpret expressions for functions in terms of the situation they model			
F-LE.5	Interpret the parameters in a linear or exponential function in terms of a context	Section 4 Linear Functions	Topic 10 Finding Solution Sets to Systems of Linear Inequalities
		Section 5 Quadratic Functions – Part 1	Topic 1 Real-World Examples of Quadratic Functions
		Section 7 Exponential Functions	Topic 3 Exponential Functions

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Statistics and Probability *

Interpreting Categorical and Quantitative Data (S-ID)

Summarize, represent, and interpret data on a single count or measurement variable

S-ID.1	Represent data with plots on the real number line (dot plots, histograms, and box plots).	Section 9 One Variable Statistics	Topic 1 Dot Plots
		Section 9 One Variable Statistics	Topic 2 Histograms
		Section 9 One Variable Statistics	Topic 3 Box Plots – Part 1
		Section 9 One Variable Statistics	Topic 4 Box Plots – Part 2
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.	Section 9 One Variable Statistics	Topic 5 Measures of Center and Shapes of Distributions
		Section 9 One Variable Statistics	Topic 6 Measures of Spread – Part 1
		Section 9 One Variable Statistics	Topic 7 Measures of Spread – Part 2
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).	Section 9 One Variable Statistics	Topic 8 Outliers in Data Sets

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Summarize, represent, and interpret data on two categorical and quantitative variables			
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.	Section 10 Two Variable Statistics	Topic 1 Relationship between Two Categorical Variables – Marginal and Joint Probabilities – Part 1
		Section 10 Two Variable Statistics	Topic 2 Relationship between Two Categorical Variables – Marginal and Joint Probabilities – Part 2
		Section 10 Two Variable Statistics	Topic 3 Relationship between Two Categorical Variables – Conditional Probabilities
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, quadratic, 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.	Section 10 Two Variable Statistics	Topic 4 Scatter Plots and Function Models
		Section 10 Two Variable Statistics	Topic 5 Scatter Plots and Lines of Best Fit
		Section 10 Two Variable Statistics	Topic 6 Residuals and Residual Plots – Part 1
		Section 10 Two Variable Statistics	Topic 7 Residuals and Residual Plots – Part 2

Interpret linear models			
S-ID.7	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.	Section 4 Linear Functions	Topic 4 Interpreting Rate of Change and y-Intercept in a Real-World Context – Part 2
		Section 10 Two Variable Statistics	Topic 5 Scatter Plots and Lines of Best Fit
S-ID.8	Compute (using technology) and interpret the correlation coefficient of a linear fit.	Section 10 Two Variable Statistics	Topic 8 Examining Correlation
S-ID.9	Distinguish between correlation and causation.	Section 10 Two Variable Statistics	Topic 8 Examining Correlation

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Notes:

1. This workbook is a compilation of the study guides that complement the Algebra Nation videos.
2. For every standard that includes technology in their descriptions, we address that in the videos using Desmos, a free online graphing calculator.
3. For those standards that involve multiple interpretations and mathematical discourse and reasoning, we address that in the videos, which complement the content of our study guides.

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Mathematical Practices Alignment

<p>MP1: Make sense of problems and persevere in solving them</p>	<p>Our Study Experts model problem solving and perseverance throughout the Algebra 1 materials. One specific reference to problem solving includes: Section 7, Topic 2: Comparing Arithmetic and Geometric Sequences In this video, we look with students at two scholarship options and help determine which one would be more realistic. Students then look at savings plans to determine more realistic option. All the while, learning about arithmetic and geometric sequences. Students can solve the problems in multiple ways and this flexibility in thinking is highlighted by the Study Expert.</p>
<p>MP2: Reason abstractly and quantitatively</p>	<p>There are several points in our resources where students are asked to represent real world situations symbolically. Students are also given abstract equations and asked to find solutions that relate to the real world context. In particular, these skills are highlighted in the following videos: Section 1, Topic 1: Using Expressions to Represent Real-World Situations Section 4, Topic 2: Rate of Change of Linear Functions Section 4, Topic 3: Interpreting Rate of Change and y-Intercept in a Real - World Context - Part 1 Section 5, Topic 10: Quadratics in Action Section 7, Topic 6: Growth and Decay Rates of Exponential Functions Section 10, Topic 5: Scatter Plots and Lines of Best Fit</p>
<p>MP3: Construct viable arguments and critique the reasoning of others</p>	<p>The style of questioning used in our resources consistently asks students to justify their reasoning. Specific examples of these types of questions can be found in the following videos: Section 1, Topic 2: Understanding Polynomial Expressions Section 1, Topic 5: Properties of Exponents Section 2, Topic 1: Equations: True or False, Solving Equations Section 3, Topic 1: Input and Output Values Section 3, Topic 6: Closure Property Section 5, Topic 5: Solving Quadratics by Factoring - Special Cases Section 6, Topic 2: Nature of the Solutions of Quadratics Section 6, Topic 3: Graphing Quadratics Using a Table Section 7, Topic 2: Comparing Arithmetic and Geometric Sequences Section 9, Topic 1: Dot Plots Section 9, Topic 2: Box Plots - Part 2 Section 9, Topic 8: Outliers in Data Sets Section 10, Topic 3: Relationship between Two Categorical Variables – Conditional Probabilities Section 10, Topic 8: Examining Correlation</p> <p>We also have problems woven throughout our videos that ask students to analyze and critique other students' work. Specific examples of this kind of questioning can be found in the following videos: Section 1, Topic 3: Algebraic Expressions Using the Distributive Property Section 1, Topic 9: Complex Numbers</p>

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	<p>Section 2, Topic 2: Identifying Properties When Solving Equations Section 8, Topic 2: Writing Piecewise-Defined Functions</p>
MP4: Model with mathematics	<p>We have students model solutions throughout the linear, quadratic and exponential function sections of our resource (Section 4, Section 5, Section 6, and Section 7). Additionally, students are asked to compare the different types of functions they learn about and choose which function most appropriately models the given situation in Section 7, Topics 7 and 8: Comparing Linear Quadratic and Exponential Functions – Parts 1 and 2.</p>
MP5: Use appropriate tools strategically	<p>Throughout the curriculum, students use calculators when necessary, such as Section 5, Topic 9: Solving Quadratics Using the Quadratic Formula, where they must estimate the square root of an irrational number to find the solution to a real world situation. Students also use Desmos (an online graphing calculator) in several videos to check solutions to quadratics, including Section 5, Topic 3: Solving Quadratics by Factoring. Students also use Desmos to test hypotheses about transformations in Section 3, Topic 11: Transformations of Functions and Section 6, Topic 8: Transformations on the Independent Variable of Quadratic Functions. Students also use Desmos in Section 3, Topic 8: Key Features of Graphs of Functions – Part 1 and Section 3, Topic 9: Key Features of Graphs of Functions – Part 2.</p>
MP6: Attend to precision	<p>Our Study Experts consistently communicate the importance of precision. Students are required to graph solutions and must label axes/provide titles. Students must also communicate mathematically with units of measure that relate to the problem they are given and relate those units to the labels of axes. Specific examples of this can be found in: Section 4, Topic 2: Rate of Change of Linear Functions Section 6, Topics 3, 4, 5, and 6: Graphing Quadratics Videos</p>
MP7: Look for and make use of structure	<p>We have multiple videos that address seeing structure in a variety of ways. Examples of this can be found in the following videos: Section 1, Topic 3: Algebraic Expressions Using the Distributive Property Section 1, Topic 4: Algebraic Expressions Using the Commutative and Associative Properties Section 1, Topic 5: Properties of Exponents Section 5, Topics 3, 4, 5, 6, and 7: Solving Quadratics Videos Section 6, Topic 5: Graphing Quadratics Using Vertex Form – Part 1 Section 6, Topic 6: Graphing Quadratics Using Vertex Form – Part 2 Section 7, Topic 4: Graphs of Exponential Functions – Part 1 Section 7, Topic 5: Graphs of Exponential Functions – Part 2</p>
MP8: Look for and express regularity in repeated reasoning	<p>Throughout the resource, students are asked look for patterns to derive formulas rather than just being given the formula at the beginning. Examples of this can be found in: Section 1, Topic 5: Properties of Exponents Section 1, Topic 6: Radical Expressions and Expressions with Rational Exponents Section 5, Topic 3: Factoring Quadratic Expressions Section 5, Topic 5: Solving Quadratics by Factoring – Special Cases Section 5, Topic 8: Deriving the Quadratic Formula Section 7, Topic 1: Geometric Sequences</p>