

Algebra I

Unit 1: Data & Functions

AI.L.5: Represent real-world problems that can be modeled with a linear function using equations, graphs, and tables; translate fluently among these representations.

AI.DS.6: Understand that statistics and data are non-neutral and designed to serve a particular interest. Analyze the possibilities for whose interest might be served and how the representations might be misleading.

AI.F.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.

AI.F.2: Identify independent and dependent variables and make predictions about the relationship.

AI.F.3: Identify the domain and range of relations represented in tables, graphs, verbal descriptions, and equations.

AI.F.4: Understand and interpret statements that use function notation in terms of a context; relate the domain of the function to its graph and to the quantitative relationship it describes

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AI.F.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. Understand that 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 . Understand the graph of f is the graph of the equation $y = f(x)$.

AI.F.2: Describe *qualitatively* the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear, has a maximum or minimum value). Sketch a graph that exhibits the qualitative features of a function that has been verbally described. Identify independent and dependent variables and make predictions about the relationship.

AI.F.3: Identify the domain and range of relations represented in tables, graphs, verbal descriptions, and equations.

AI.F.4: Understand and interpret statements that use function notation in terms of a context; relate the domain of the function to its graph and to the quantitative relationship it describes.

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Unit 2: Rate of Change

AI.F.2: Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear, has a maximum or minimum value). Sketch a graph that exhibits the qualitative features of a function that has been verbally described.

AI.L.5: Represent real-world problems that can be modeled with a linear function using equations, graphs, and tables; translate fluently among these representations, and interpret the slope and intercepts.

AI.F.2: Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear, has a maximum or minimum value). Sketch a graph that exhibits the qualitative features of a function that has been verbally described. Identify independent and dependent variables and make predictions about the relationship.

AI.L.5: Represent real-world problems that can be modeled with a linear function using equations, graphs, and tables; translate fluently among these representations, and interpret the slope and intercepts.

AI.L.2: Represent real-world problems using linear equations and inequalities in one variable and solve such problems. Interpret the solution and determine whether it is reasonable.

AI.L.3: Represent real-world and other mathematical problems using an algebraic proportion that leads to a linear equation and solve such problems.

AI.QE.1: Distinguish between situations that can be modeled with linear functions and with exponential functions. Understand that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. Compare linear functions and exponential functions that model real-world situations using tables, graphs, and equations.

AI.L.5: Represent real-world problems that can be modeled with a linear function using equations, graphs, and tables; translate fluently among these representations, and interpret the slope and intercepts.

AI.L.4: Represent linear functions as graphs from equations (with and without technology), equations from graphs, and equations from tables and other given information (e.g., from a given point on a line and the slope of the line).

AI.L.6: Translate among equivalent forms of equations for linear functions, including slope-intercept, point-slope, and standard. Recognize that different forms reveal more or less information about a given situation.

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Unit 3: Linear Models

AI.L.4: Represent linear functions as graphs from equations (with and without technology), equations from graphs, and equations from tables and other given information (e.g., from a given point on a line and the slope of the line).

AI.L.5: Represent real-world problems that can be modeled with a linear function using equations, graphs, and tables; translate fluently among these representations, and interpret the slope and intercepts.

AI.DS.2: Graph bivariate data on a scatter plot and describe the relationship between the variables.

AI.DS.3: Use technology to find a linear function that models a relationship for a bivariate data set to make predictions; interpret the slope and y- intercept, and compute (using technology) and interpret the correlation coefficient.

AI.DS.4: Distinguish between correlation and causation.

AI.DS.1: Distinguish between random and non- random sampling methods, identify possible sources of bias in sampling, describe how such bias can be controlled and reduced, evaluate the characteristics of a good survey and well-designed experiment, design simple experiments or investigations to collect data to answer questions of interest, and make inferences from sample results.

AI.DS.5: Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns (including joint, marginal, and conditional relative frequencies) to describe possible associations and trends in the data.

AI.DS.6: Understand that statistics and data are non-neutral and designed to serve a particular interest. Analyze the possibilities for whose interest might be served and how the representations might be misleading.

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Unit 4: Solving Equations

AI.L.1: Understand that the steps taken when solving linear equations create new equations that have the same solution as the original. Solve fluently linear equations and inequalities in one variable with integers, fractions, and decimals as coefficients. Explain and justify each step in solving an equation, starting from the assumption that the original equation has a solution. Justify the choice of a solution method.

AI.L.2: Represent real-world problems using linear equations and inequalities in one variable and solve such problems. Interpret the solution and determine whether it is reasonable.

AI.L.3: Represent real-world and other mathematical problems using an algebraic proportion that leads to a linear equation and solve such problems.

AI.L.7: Represent real-world problems using linear inequalities in two variables and solve such problems; interpret the solution set and determine whether it is reasonable. Solve other linear inequalities in two variables by graphing.

AI.L.8: Solve compound linear inequalities in one variable, and represent and interpret the solution on a number line. Write a compound linear inequality given its number line representation.

AI.L.11: Solve equations and formulas for a specified variable, including equations with coefficients represented by variables.

AI.F.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. Understand that 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 . Understand the graph of f is the graph of the equation $y = f(x)$.

AI.F.2: Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear, has a maximum or minimum value). Sketch a graph that exhibits the qualitative features of a function that has been verbally described. Identify independent and dependent variables and make predictions about the relationship.

AI.L.9: Solve absolute value linear equations in one variable.

AI.L.10: Graph absolute value linear equations in two variables.

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Unit 5: Systems of Equations

AI.SEI.1: Understand the relationship between a solution of a pair of linear equations in two variables and the graphs of the corresponding lines. Solve pairs of linear equations in two variables by graphing; approximate solutions when the coordinates of the solution are non-integer numbers.

AI.SEI.3: Write a system of two linear equations in two variables that represents a real-world problem and solve the problem with and without technology. Interpret the solution and determine whether the solution is reasonable.

AI.SEI.4: Represent real-world problems using a system of two linear inequalities in two variables and solve such problems; interpret the solution set and determine whether it is reasonable. Solve other pairs of linear inequalities by graphing with and without technology.

AI.SEI.1: Understand the relationship between a solution of a pair of linear equations in two variables and the graphs of the corresponding lines. Solve pairs of linear equations in two variables by graphing; approximate solutions when the coordinates of the solution are non-integer numbers.

AI.SEI.2: Understand 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 pairs of linear equations in two variables using substitution and elimination.

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Unit 6: Exponential Functions

AI.F.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. Understand that 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 . Understand the graph of f is the graph of the equation $y = f(x)$.

AI.F.3: Identify the domain and range of relations represented in tables, graphs, verbal descriptions, and equations.

AI.QE.1: Distinguish between situations that can be modeled with exponential functions. Understand that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. Compare linear functions and exponential functions that model real-world situations using tables, graphs, and equations.

AI.QE.2: Represent real-world and other mathematical problems that can be modeled with exponential functions using tables, graphs, and equations of the form $y = ab^x$ (for integer values of $x > 1$, rational values of $b > 0$ and $b \neq 1$);

A1.QE.3: Graph exponential and quadratic equations in two variables with and without technology.

AI.QE.5: Represent real-world problems using quadratic equations in one or two variables.

AI.RNE.3: Rewrite and evaluate numeric expressions with positive rational exponents using the properties of exponents.

AI.RNE.5: Simplify algebraic rational expressions, with numerators and denominators containing monomial bases with integer exponents, to equivalent forms

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AI.F.2: Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear, has a maximum or minimum value).

AI.F.3: Identify the domain and range of relations represented in tables, graphs, verbal descriptions, and equations.

AI.QE.1: Distinguish between situations that can be modeled with linear functions and with exponential functions. Understand that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. Compare linear functions and exponential functions that model real-world situations using tables, graphs, and equations.

AI.QE.2: Represent real-world and other mathematical problems that can be modeled with exponential functions using tables, graphs, and equations of the form $y = ab^x$ (for integer values of $x > 1$, rational values of $b > 0$ and $b \neq 1$); translate fluently among these representations and interpret the values of a and b .

A1.QE.3: Graph exponential equations in two variables with and without technology.

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Unit 7: Quadratic Functions and Polynomials

AI.F.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. Understand that 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 . Understand the graph of f is the graph of the equation $y = f(x)$.

AI.F.3: Identify the domain and range of relations represented in tables, graphs, verbal descriptions, and equations.

A1.QE.3: Graph quadratic equations in two variables with and without technology.

AI.QE.5: Represent real-world problems using quadratic equations or two variables.

AI.RNE.6: Factor common terms from polynomials and factor polynomials completely. Factor the difference of two squares, perfect square trinomials, and other quadratic expressions.

AI.RNE.7: Understand polynomials are closed under the operations of addition, subtraction, and multiplication with integers; add, subtract, and multiply polynomials and divide polynomials by monomials.

AI.F.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. Understand that 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 . Understand the graph of f is the graph of the equation $y = f(x)$.

AI.F.2: Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear, has a maximum or minimum value).

AI.F.3: Identify the domain and range of relations represented in tables, graphs, verbal descriptions, and equations.

AI.QE.3: Graph quadratic equations in two variables with and without technology.

AI.QE.5: Represent real-world problems using quadratic equations in one or two variables.

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Unit 8: Solving Quadratic Equations

AI.QE.4: Solve quadratic equations in one variable by inspection (e.g., for $x^2 = 49$), finding square roots, and factoring, as appropriate to the initial form of the equation.

AI.QE.5: Represent real-world problems using quadratic equations in one or two variables and solve such problems with and without technology. Interpret the solution and determine whether it is reasonable.

AI.QE.6: Use the process of factoring to determine zeros, lines of symmetry, and extreme values in real-world and other mathematical problems involving quadratic functions; interpret the results in the real-world contexts.

AI.QE.7: Describe the relationships among the solutions of a quadratic equation, the zeros of the function, the x-intercepts of the graph, and the factors of the expression.

AI.RNE.1: Understand the hierarchy and relationships of numbers and sets of numbers within the real number system.

AI.RNE.2: 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.

AI.RNE.4: Simplify square roots of non-perfect square integers and algebraic monomials.

AI.QE.4: Solve quadratic equations in one variable by inspection (e.g., for $x^2 = 49$), using the quadratic formula, and factoring, as appropriate to the initial form of the equation.