Georgia Mathematics

Algebra: Concepts & Connections (Semester 1)

Modeling Linear Functions

2. **Construct and interpret arithmetic sequences as functions, algebraically and graphically, to model and explain real-life phenomena. Use formal notation to represent linear functions and the key characteristics of graphs of linear functions, and informally compare linear and nonlinear functions using parent graphs.** A.FRR.2

   1 Use mathematically applicable situations algebraically and graphically to build and interpret arithmetic sequences as functions whose domain is a subset of the integers. A.FGR.2.1

   2 Construct and interpret the graph of a linear function that models real-life phenomena and represents key characteristics of the graph using formal notation. A.FGR.2.2

   3 Relate the domain and range of a linear function to its graph and, where applicable, to the quantitative relationship it describes. Use formal notation and set notation to describe the domain and range of linear functions. A.FGR.2.3

   4 Use function notation to build and evaluate linear functions for inputs in their domains and interpret statements that use function notation in terms of a mathematical framework. A.FGR.2.4

   5 Analyze the difference between linear functions and nonlinear functions by informally analyzing the graphs of various parent functions (linear, quadratic, exponential, absolute value, square root, and cube root parent curves). A.FGR.2.5

Analyzing Linear Inequalities

4. **Create, analyze, and solve linear inequalities in two variables and systems of linear inequalities to model real-life phenomena.** A.PAR.4

   1 Create and solve linear inequalities in two variables to represent relationships between quantities including mathematically applicable situations; graph inequalities on coordinate axes with labels and scales. A.PAR.4.1

   2 Represent constraints of linear inequalities and interpret data points as possible or not possible. A.PAR.4.2

   3 Solve systems of linear inequalities by graphing, including systems representing a mathematically applicable situation. A.PAR.4.3

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Investigate rational and irrational numbers and rewrite expressions involving square roots and cube roots. A.NR.5

1. Rewrite algebraic and numeric expressions involving radicals. A.NR.5.1
2. Using numerical reasoning, show and explain that the sum or product of rational numbers is rational, the sum of a rational number and an irrational number is irrational, and the product of a nonzero rational number and an irrational number is irrational. A.NR.5.2

Modeling and Analyzing Quadratic Functions

7. **Construct and interpret quadratic functions from data points to model and explain real-life phenomena; describe key characteristics of the graph of a quadratic function to explain a contextual situation for which the graph serves as a model.** A.FGR.7
   1. Use function notation to build and evaluate quadratic functions for inputs in their domains and interpret statements that use function notation in terms of a given framework. (See the Mathematical Modeling Framework and Statistical Reasoning Framework for contextual connections.) A.FGR.7.1
   2. Identify the effect on the graph generated by a quadratic function when replacing f(x) with f(x) + k, kf(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. A.FGR.7.2
   3. Graph and analyze the key characteristics of quadratic functions including contextual situations. A.FGR.7.3
   4. Relate the domain and range of a quadratic function to its graph and, where applicable, to the quantitative relationship it describes. A.FGR.7.4
   5. Rewrite a quadratic function representing a mathematically applicable situation to reveal the maximum or minimum value of the function it defines. Explain what the value describes in context. A.FGR.7.5
   6. Create quadratic functions in two variables to represent relationships between quantities; graph quadratic functions on the coordinate axes with labels and scales. A.FGR.7.6
   7. Estimate, calculate, and interpret the average rate of change of a quadratic function and make comparisons to the average rate of change of linear functions. A.FGR.7.7
   8. Write a function defined by a quadratic expression in different but equivalent forms to reveal and explain different properties of the function. A.FGR.7.8
   9. Compare characteristics of two functions each represented in a different way. A.FGR.7.9

8. **Create and analyze exponential expressions and equations to represent and model real-life phenomena; solve exponential equations in mathematically applicable situations.** A.PAR.8
   1. Interpret exponential expressions and parts of an exponential expression that represent a quantity in terms of its framework. (See the Mathematical Modeling Framework and Statistical Reasoning Framework for contextual connections.) A.PAR.8.1
   2. Create exponential equations in one variable and use them to solve problems, including mathematically applicable situations. A.PAR.8.2

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3 Create exponential equations in two variables to represent relationships between quantities, including in mathematically applicable situations; graph equations on coordinate axes with labels and scales. A.PAR.8.3

4 Represent constraints by exponential equations and interpret data points as possible or not possible in a modeling environment. A.PAR.8.4