

Grade 8 - Algebra 8 - Unit 3: Functions

Massachusetts Learning Standards Taught in this Unit

Creating Equations AI.A-CED

- A. Create equations that describe numbers or relationships.
2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
3. Represent constraints by linear equations or inequalities, and by systems of linear equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context.

Functions Interpreting Functions AI.F-IF

- A. Understand the concept of a function and use function notation.
 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 (range) of f corresponding to the input x . The graph of f is the graph of the equation $y = f(x)$.
 2. Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
- B. Interpret linear, quadratic, and exponential functions with integer exponents that arise in applications in terms of the context.
 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; and end behavior.
 5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
 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.
- C. Analyze functions using different representations.
 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.

Number and Quantity

Quantities AI.N-Q

- A. Reason quantitatively and use units to solve problems.
 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.

Functions

Linear, Quadratic, and Exponential Models AI.F-LE

- A. Construct and compare linear, quadratic, and exponential models and solve problems.
2. Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a

description of a relationship, or two input-output pairs (including reading these from a table).

B. Interpret expressions for functions in terms of the situation they model.

5. Interpret the parameters in a linear or exponential function (of the form $f(x) = b x + k$) in terms of a context.

Algebra

Reasoning with Equations and Inequalities A1.A-REI

D. Represent and solve equations and inequalities graphically.

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). Show that any point on the graph of an equation in two variables is a solution to the equation.

Statistics and Probability

Interpreting Categorical and Quantitative Data A1.S-ID

C. Interpret linear models.

7. Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.

Functions

Building Functions A1.F-BF

A. Build a function that models a relationship between two quantities.

1. Write linear, quadratic, and exponential functions that describe a relationship between two quantities.

a. Determine an explicit expression, a recursive process, or steps for calculation from a context.

B. Build new functions from existing functions.

3. Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $kf(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Include linear, quadratic, exponential, and absolute value functions. Utilize technology to experiment with cases and illustrate an explanation of the effects on the graph.