Instruction

Prerequisite Skills

This lesson requires the use of the following skills:

- plotting points on the coordinate plane, given data in a table (5.G.1)
- plotting the graph of a linear function from an equation (A–CED.2★)
- plotting the graph of an exponential function from an equation (A–CED.2★)
- evaluating a function at a given input value (F–IF.2)
- solving a function for x given a y-value (A–CED.4★)
- interpreting a function in context using a graph or an equation (8.F.5)

Introduction

Data with two quantitative variables can be represented using a scatter plot. A **scatter plot** is a graph of data in two variables on a coordinate plane, where each data pair is represented by a point. Relationships between the two quantitative variables can be observed on the graph. A **function** is a relation of two variables where each input is assigned to one and only one output. Functions in two variables can be represented algebraically with an equation, numerically with a table, or graphically on the coordinate plane. Graphing a function on the same coordinate plane as a scatter plot for a data set allows us to see if the function is a good estimation of the relationship between the two variables in the data set. The graph and the equation of the function can be used to estimate coordinate pairs that are not included in the data set.

Key Concepts

- Data with two quantitative variables can be shown graphically on a scatter plot.
- To create a scatter plot, plot each pair of data as a point on a coordinate plane.
- To compare a data set and a function, plot the function on the same coordinate plane as the scatter plot of the data set. The graph of the function should approximate the shape of the scatter plot.
- Evaluating a function that has a similar shape as a data set can provide an estimate for data not included in the plotted data set.
- Evaluate a function algebraically for a given value of x or y by substituting the given value for x or y and solving for the remaining variable.

Instruction

- Evaluate a function graphically for a given value of x or y by finding the point on the graph of the function with the known coordinate, then finding the corresponding x- or y-value of that point.
- To determine whether a data set is best represented by a linear function or an exponential function, plot the data points and determine whether the points follow the shape of a straight line or an exponential curve.
- This determination can also be made by considering the context of the problem. If there is a constant rate of change, a linear function is the best model. However, if the rate of change increases or decreases as the independent variable increases, then an exponential function may be the best model.
- Graph a linear function by plotting at least two points and drawing a line through those points.
- Graph an exponential function by plotting at least five points. Connect the points with a curve.

Common Errors/Misconceptions

- confusing when to evaluate and when to solve a function
- using a linear function to estimate a relationship between two variables when an exponential function is a better fit
- using an exponential function to estimate a relationship between two variables when a linear function is a better fit
- confusing x and y when graphing data points or analyzing a graph