

UNIT 6 • DESCRIBING DATA

Lesson 3: Interpreting Linear Models

Instruction

Prerequisite Skills

This lesson requires the use of the following skills:

- creating a scatter plot given data in a table (8.SP.1)
- finding a linear fit given a scatter plot (S-ID.6c)
- understanding the connection between a graph and an equation of a linear function (8.F.3)
- determining the slope and y -intercept of a linear function given a graph or an equation (8.F.4)

Introduction

When linear functions are used to model real-world relationships, the slope and y -intercept of the linear function can be interpreted in context. Recall that data in a scatter plot can be approximated using a linear fit, or linear function that models real-world relationships. A **linear fit** is the approximation of data using a linear function.

The **slope** of a linear function is the change in the dependent variable divided by the change in the independent variable. When written as a decimal, the slope describes how much y changes when x changes by 1. When analyzing the slope in the context of a real-world situation, remember to use the units of x and y in the calculation of the slope. For example, if the x -axis of a graph represents hours and the y -axis represents miles traveled, the slope of a linear function graphed on these axes would be $\frac{\text{change in miles}}{\text{change in hours}}$, or the miles traveled each hour.

The **y -intercept** of a function is the value of y at which the graph of the function intersects the y -axis, or the value of y when x equals 0. When analyzing the y -intercept in a real-world context, it is the initial value of whatever quantity is represented by the y -axis. For example, if the x -axis represents hours and the y -axis represents miles traveled, the y -intercept would be the miles traveled when the number of hours equals 0. The y -intercept in the equation $y = mx + b$ is b .

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Key Concepts

- The slope of a line with the equation $y = mx + b$ is m , and the y -intercept of a line with the equation $y = mx + b$ is b .
- The slope of a line is $m = \frac{\text{change in } y}{\text{change in } x}$; the slope between two points (x_1, y_1) and (x_2, y_2) is $m = \frac{y_2 - y_1}{x_2 - x_1}$.
- In context, when written as a decimal, the slope describes how much the dependent variable changes each time the independent variable changes by 1 unit.
- In context, the y -intercept is the initial value of the quantity represented by the y -axis, or the quantity of y when $x = 0$.

Common Errors/Misconceptions

- incorrectly calculating the slope
- confusing the y - and x -intercepts, both in context and when calculating using a graph or equation