1-4

Study Guide

Writing Linear Equations

The form in which you write an equation of a line depends on the information you are given. Given the slope and y-intercept, or given the slope and one point on the line, the **slope-intercept** form can be used to write the equation.

Example 1 Write an equation in slope-intercept form for each line described.

a. a slope of $\frac{2}{3}$ and a y-intercept of -5

Substitute $\frac{2}{3}$ for m and -5 for b in the general slope-intercept form.

$y = mx + b \quad \rightarrow \quad y = \frac{2}{3}x - 5.$

The slope-intercept form of the equation of the line is $y = \frac{2}{3}x - 5$.

b. a slope of 4 and passes through the point at $(-2, 3)$

Substitute the slope and coordinates of the point in the general slope-intercept form of a linear equation. Then solve for b.

$y = mx + b$

$3 = 4(-2) + b$ *Substitute -2 for x, 3 for y, and 4 for m.*

$11 = b$ *Add 8 to both sides of the equation.*

The y-intercept is 11. Thus, the equation for the line is $y = 4x + 11$.

When you know the coordinates of two points on a line, you can find the slope of the line. Then the equation of the line can be written using either the slope-intercept or the **point-slope** form, which is $y - y_1 = m(x - x_1)$.

Example 2 ***Sales*** **In 1998, the average weekly first-quarter sales at Vic's Hardware store were \$9250. In 1999, the average weekly first-quarter sales were \$10,100. Assuming a linear relationship, find the average quarterly rate of increase.**

(1, 9250) and (5, 10,100)

$m = \frac{y_2 - y_1}{x_2 - x_1}$

$= \frac{10{,}100 - 9250}{5 - 1}$

$= \frac{850}{4}$ or 212.5

Since there are two data points, identify the two coordinates to find the slope of the line. Coordinate 1 represents the first quarter of 1998 and coordinate 5 represents the first quarter of 1999.

Thus, for each quarter, the average sales increase was \$212.50.