Using ALTERNATIVE METHODS

Another Way to Solve Example 4, page 100

MULTIPLE REPRESENTATIONS In Example 4 on page 100, you wrote an equation of a line through two given points by first writing the equation in point-slope form and then rewriting it in slope-intercept form. You can also write an equation of a line through two points by using the slope-intercept form to solve for the y-intercept.

PROBLEM

Write an equation of the line that passes through $(5, -2)$ and $(2, 10)$.

METHOD

Solving for the y-Intercept To write an equation of a line through two points, you can substitute the slope and the coordinates of one of the points into $y = mx + b$ and solve for the y-intercept b.

STEP 1 **Find** the slope of the line.

$$m = \frac{10 - (-2)}{2 - 5} = \frac{12}{-3} = -4$$

STEP 2 **Substitute** the slope and the coordinates of one point into the slope-intercept form. Use the point $(5, -2)$.

$$y = mx + b$$
$$-2 = -4(5) + b$$

STEP 3 **Solve** for b.

$$-2 = -20 + b$$
$$18 = b$$

STEP 4 **Substitute** m and b into the slope-intercept form.

$$y = -4x + 18$$

PRACTICE

1. **WRITE AN EQUATION** Use the method above to write an equation of the line that passes through $(2, 15)$ and $(7, 35)$.

2. **FITNESS** At a speed of 45 yards per minute, a 120 pound swimmer burns 420 calories per hour and a 172 pound swimmer burns 600 calories per hour. Use two different methods to write a linear equation that models the number of calories burned per hour as a function of a swimmer's weight.

3. **SAFETY** A motorist lights an emergency flare after having a flat tire. After burning for 6 minutes, the flare is 13 inches long. After burning for 20 minutes, it is 6 inches long. Use two different methods to write a linear equation that models the flare's length as a function of time.

4. **SNOWFALL** After 4 hours of snowfall, the snow depth is 8 inches. After 6 hours of snowfall, the snow depth is 9.5 inches. Use two different methods to write a linear equation that models the snow depth as a function of time.

5. **ARCHAEOLOGY** Ancient cities often rose in elevation through time as citizens built on top of accumulating rubble and debris. An archaeologist at a site dates artifacts from a depth of 54 feet as 3500 years old and artifacts from a depth of 26 feet as 2600 years old. Use two different methods to write a linear equation that models an artifact's age as a function of depth.

6. **REASONING** Suppose a line has slope m and passes through (x_1, y_1). Write an expression for the y-intercept b in terms of m, x_1, and y_1.