EXAMPLE 4 Write an equation given two points

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

ANOTHER WAY
For an alternative method for solving the problem in Example 4, turn to page 105 for the **Problem Solving Workshop**.

Solution

The line passes through $(x_1, y_1) = (5, -2)$ and $(x_2, y_2) = (2, 10)$. Find its slope.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{10 - (-2)}{2 - 5} = \frac{12}{-3} = -4$$

You know the slope and a point on the line, so use point-slope form with either given point to write an equation of the line. Choose $(x_1, y_1) = (2, 10)$.

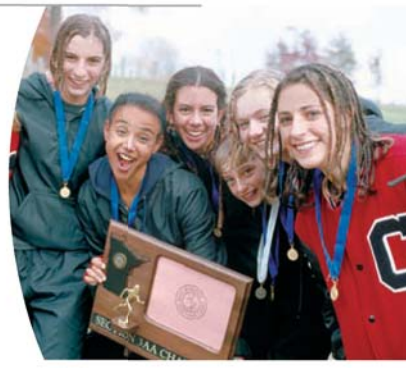
$y - y_1 = m(x - x_1)$ **Use point-slope form.**

$y - 10 = -4(x - 2)$ **Substitute for m, x_1, and y_1.**

$y - 10 = -4x + 8$ **Distributive property**

$y = -4x + 18$ **Write in slope-intercept form.**

EXAMPLE 5 Write a model using slope-intercept form



SPORTS In the school year ending in 1993, 2.00 million females participated in U.S. high school sports. By 2003, the number had increased to 2.86 million. Write a linear equation that models female sports participation.

Solution

STEP 1 **Define** the variables. Let x represent the time (in years) since 1993 and let y represent the number of participants (in millions).

STEP 2 **Identify** the initial value and rate of change. The initial value is 2.00. The rate of change is the slope m.

AVOID ERRORS
Because time is defined in years since 1993 in Step 1, 1993 corresponds to $x_1 = 0$ and 2003 corresponds to $x_2 = 10$.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2.86 - 2.00}{10 - 0} = \frac{0.86}{10} = 0.086$$

Use $(x_1, y_1) = (0, 2.00)$ and $(x_2, y_2) = (10, 2.86)$.

STEP 3 **Write** a verbal model. Then write a linear equation.

Participants (millions)	=	Initial number	+	Rate of change	·	Years since 1993
y	=	2.00	+	0.086	·	x

▶ In slope-intercept form, a linear model is $y = 0.086x + 2.00$.

GUIDED PRACTICE for Examples 4 and 5

Write an equation of the line that passes through the given points.

6. (−2, 5), (4, −7) **7.** (6, 1), (−3, −8) **8.** (−1, 2), (10, 0)

9. SPORTS In Example 5, the corresponding data for males are 3.42 million participants in 1993 and 3.99 million participants in 2003. Write a linear equation that models male participation in U.S. high school sports.