GOAL **Write equations of lines.**

EXAMPLE 1 Use slope and *y*-intercept to write an equation

Write an equation of the line with a slope of $\frac{1}{2}$ and a *y*-intercept of −7.

Solution

$y = mx + b$ Write slope-intercept form.

$y = \frac{1}{2}x - 7$ Substitute $\frac{1}{2}$ for m and -7 for b.

Exercises for Example 1

Write an equation of the line with the given slope and *y*-intercept.

1. slope: 7

   y-intercept: −11

2. slope: $\frac{2}{3}$

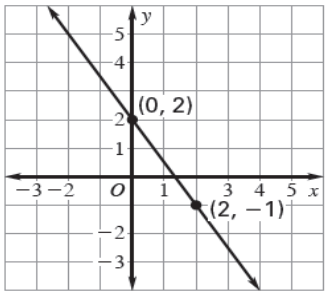
   y-intercept: 5

3. slope: $-\frac{7}{5}$

   y-intercept: −2

EXAMPLE 2 Write an equation of a line given two points

Write an equation of the line shown.



Solution

STEP 1 **Calculate** the slope.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2 - (-1)}{0 - 2} = -\frac{3}{2}$$

STEP 2 **Write** an equation of the line.
The line crosses the *y*-axis at (0, 2).
So, the *y*-intercept is 2.

$y = mx + b$ Write slope-intercept form.

$y = -\frac{3}{2}x + 2$ Substitute $-\frac{3}{2}$ for m and 2 for b.

Exercises for Example 2

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

4. $(10, 4), (0, -1)$

5. $(0, 8), (5, -1)$

6. $(-6, -8), (0, -14)$

EXAMPLE 3 **Write a linear function**

Write an equation for the linear function *f* with the values *f*(0) = 7 and *f*(12) = 15.

Solution

STEP 1 **Write** $f(0) = 7$ as $(0, 7)$ and $f(12) = 15$ as $(12, 15)$.

STEP 2 **Calculate** the slope of the line that passes through $(0, 7)$ and $(12, 15)$.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{15 - 7}{12 - 0} = \frac{8}{12} = \frac{2}{3}$$

STEP 3 **Write** an equation of the line. The line crosses the y-axis at $(0, 7)$. So, the y-intercept is 7.

$y = mx + b$ Write slope-intercept form.

$y = \frac{2}{3}x + 7$ Substitute $\frac{2}{3}$ for m and 7 for b.

The function is $f(x) = \frac{2}{3}x + 7$.

Exercises for Example 3

Write an equation for the linear function *f* with the given values.

7. $f(0) = 21, f(4) = 13$

8. $f(3) = -12, f(0) = 6$