4-2 Writing Equations in Slope-Intercept Form

Write an equation of the line that passes through the given point and has the given slope.

1. (3, −3), slope 3

**SOLUTION:**
Find the y-intercept.

\[ y = mx + b \]
\[ -3 = 3(3) + b \]
\[ -3 = 9 + b \]
\[ -12 = b \]

Write the equation in slope-intercept form.

\[ y = mx + b \]
\[ y = 3x - 12 \]

2. (2, 4), slope 2

**SOLUTION:**
Find the y-intercept.

\[ y = mx + b \]
\[ 4 = 2(2) + b \]
\[ 4 = 4 + b \]
\[ 0 = b \]

Write the equation in slope-intercept form.

\[ y = mx + b \]
\[ y = 2x + 0 \]
\[ y = 2x \]

3. (1, 5), slope −1

**SOLUTION:**
Find the y-intercept.

\[ y = mx + b \]
\[ 5 = -1(1) + b \]
\[ 5 = -1 + b \]
\[ 6 = b \]

Write the equation in slope-intercept form.

\[ y = mx + b \]
\[ y = -x + 6 \]
4-2 Writing Equations in Slope-Intercept Form

4. (−4, 6), slope −2

*SOLUTION:
Find the y-intercept.

\[ y = mx + b \]
\[ 6 = -2(-4) + b \]
\[ 6 = 8 + b \]
\[ -2 = b \]

Write the equation in slope-intercept form.

\[ y = mx + b \]
\[ y = -2x - 2 \]

Write an equation of the line that passes through each pair of points.
5. (4, −3), (2, 3)

*SOLUTION:
Find the slope of the line containing the given points.

\[ m = \frac{y_2 - y_1}{x_2 - x_1} \]
\[ = \frac{3 - (-3)}{2 - 4} \]
\[ = \frac{6}{-2} \]
\[ = -3 \]

Use the slope and either of the two points to find the y-intercept.

\[ y = mx + b \]
\[ -3 = -3(4) + b \]
\[ -3 = -12 + b \]
\[ 9 = b \]

Write the equation in slope-intercept form.

\[ y = mx + b \]
\[ y = -3x + 9 \]
6. $(-7, -3), (-3, 5)$

**SOLUTION:**
Find the slope of the line containing the given points.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{5 - (-3)}{-3 - (-7)} = \frac{8}{4} = 2$$

Use the slope and either of the two points to find the y-intercept.

$$y = mx + b$$
$$-3 = 2(-7) + b$$
$$-3 = -14 + b$$
$$11 = b$$

Write the equation in slope-intercept form.

$$y = mx + b$$
$$y = 2x + 11$$
4-2 Writing Equations in Slope-Intercept Form

7. \((-1, 3), (0, 8)\)

**SOLUTION:**

Find the slope of the line containing the given points.

\[
m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{8 - 3}{0 - (-1)} = \frac{5}{1} = 5
\]

Use the slope and either of the two points to find the y-intercept.

\[
y = mx + b \\
3 = 5(-1) + b \\
3 = -5 + b \\
8 = b
\]

Write the equation in slope-intercept form.

\[
y = mx + b \\
y = 5x + 8
\]
8. \((-2, 6), (0, 0)\)

**SOLUTION:**
Find the slope of the line containing the given points.

\[
m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{0 - 6}{0 - (-2)} = \frac{-6}{2} = -3
\]

Use the slope and either of the two points to find the y-intercept.

\[
y = mx + b
\]
\[
6 = -3(-2) + b
\]
\[
6 = 6 + b
\]
\[
0 = b
\]

Write the equation in slope-intercept form.

\[
y = mx + b
\]
\[
y = -3x + 0
\]
\[
y = -3x
\]
9. **WHITewater RAFTING** Ten people from a local youth group went to Black Hills Whitewater Rafting Tour Company for a one-day rafting trip. The group paid $425.

   a. Write an equation in slope-intercept form to find the total cost $C$ for $p$ people.

   b. How much would it cost for 15 people?

   **SOLUTION:**
   a. Find the guide fee ($C$-intercept).

   \[ C = mp + b \]

   \[ 425 = 35(10) + b \]
   \[ 425 = 350 + b \]
   \[ 75 = b \]

   Write the equation in slope-intercept form.

   \[ C = mp + b \]
   \[ C = 35p + 75 \]

   The total cost $C$ for $p$ people can be represented by the linear equation $C = 35p + 75$.

   b. Solve for $C$ when $p = 15$.

   \[ C = 35p + 75 \]
   \[ C = 35(15) + 75 \]
   \[ C = 525 + 75 \]
   \[ C = 600 \]

   So, the cost for 15 people is $600.
4-2 Writing Equations in Slope-Intercept Form

Write an equation of the line that passes through the given point and has the given slope.

10. (3, 1), slope 2
   SOLUTION:
   Find the y-intercept.

   \[ y = mx + b \]
   \[ 1 = 2(3) + b \]
   \[ 1 = 6 + b \]
   \[ -5 = b \]

   Write the equation in slope-intercept form.

   \[ y = mx + b \]
   \[ y = 2x - 5 \]

11. (-1, 4), slope -1
   SOLUTION:
   Find the y-intercept.

   \[ y = mx + b \]
   \[ 4 = -1(-1) + b \]
   \[ 4 = 1 + b \]
   \[ 3 = b \]

   Write the equation in slope-intercept form.

   \[ y = mx + b \]
   \[ y = -x + 3 \]

12. (1, 0), slope 1
   SOLUTION:
   Find the y-intercept.

   \[ y = mx + b \]
   \[ 0 = 1(1) + b \]
   \[ 0 = 1 + b \]
   \[ -1 = b \]

   Write the equation in slope-intercept form.

   \[ y = mx + b \]
   \[ y = x - 1 \]
4-2 Writing Equations in Slope-Intercept Form

13. (7, 1), slope 8

**SOLUTION:**
Find the y-intercept.

\[ y = mx + b \]
\[ 1 = 8(7) + b \]
\[ 1 = 56 + b \]
\[-55 = b \]

Write the equation in slope-intercept form.

\[ y = mx + b \]
\[ y = 8x - 55 \]

14. (2, 5), slope -2

**SOLUTION:**
Find the y-intercept.

\[ y = mx + b \]
\[ 5 = -2(2) + b \]
\[ 5 = -4 + b \]
\[ 9 = b \]

Write the equation in slope-intercept form.

\[ y = mx + b \]
\[ y = -2x + 9 \]

15. (2, 6), slope 2

**SOLUTION:**
Find the y-intercept.

\[ y = mx + b \]
\[ 6 = 2(2) + b \]
\[ 6 = 4 + b \]
\[ 2 = b \]

Write the equation in slope-intercept form.

\[ y = mx + b \]
\[ y = 2x + 2 \]
4-2 Writing Equations in Slope-Intercept Form

Write an equation of the line that passes through each pair of points.
16. \((9, -2), (4, 3)\)

**SOLUTION:**
Find the slope of the line containing the given points.

\[
m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3 - (-2)}{4 - 9} = \frac{5}{-5} = -1
\]

Use the slope and either of the two points to find the \(y\)-intercept.

\[
y = mx + b
\]
\[-2 = -1(9) + b \Rightarrow -2 = -9 + b \Rightarrow b = 7
\]

Write the equation in slope-intercept form.

\[
y = mx + b
\]
\[y = -x + 7
\]
17. \((-2, 5), (5, -2)\)

**SOLUTION:**
Find the slope of the line containing the given points.

\[
m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-2 - 5}{5 - (-2)} = \frac{-7}{7} = -1
\]

Use the slope and either of the two points to find the \(y\)-intercept.

\[
y = mx + b
\]
\[
5 = -1(-2) + b \quad \Rightarrow \quad 5 = 2 + b \quad \Rightarrow \quad 3 = b
\]

Write the equation in slope-intercept form.

\[
y = mx + b
\]
\[
y = -x + 3
\]
4-2 Writing Equations in Slope-Intercept Form

18. $(-5, 3), (0, -7)$

**SOLUTION:**
Find the slope of the line containing the given points.

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{-7 - 3}{0 - (-5)}$$
$$= \frac{-10}{5}$$
$$= -2$$

Use the slope and either of the two points to find the $y$-intercept.

$$y = mx + b$$
$$3 = -2(-5) + b$$
$$3 = 10 + b$$
$$-7 = b$$

Write the equation in slope-intercept form.

$$y = mx + b$$
$$y = -2x - 7$$
4-2 Writing Equations in Slope-Intercept Form

19. (3, 5), (2, -2)

**SOLUTION:**
Find the slope of the line containing the given points.

\[ m = \frac{y_2 - y_1}{x_2 - x_1} \]
\[ = \frac{-2 - 5}{2 - 3} \]
\[ = \frac{-7}{-1} \]
\[ = 7 \]

Use the slope and either of the two points to find the y-intercept.

\[ y = mx + b \]
\[ 5 = 7(3) + b \]
\[ 5 = 21 + b \]
\[ -16 = b \]

Write the equation in slope-intercept form.

\[ y = mx + b \]
\[ y = 7x - 16 \]
4-2 Writing Equations in Slope-Intercept Form

20. (−1, −3), (−2, 3)

**SOLUTION:**
Find the slope of the line containing the given points.

\[
m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3 - (-3)}{-2 - (-1)} = \frac{6}{-1} = -6
\]

Use the slope and either of the two points to find the y-intercept.

\[
y = mx + b
\]

\[
-3 = -6(-1) + b
\]

\[
-3 = 6 + b
\]

\[
-9 = b
\]

Write the equation in slope-intercept form.

\[
y = mx + b
\]

\[
y = -6x - 9
\]
4-2 Writing Equations in Slope-Intercept Form

21. (−2, −4), (2, 4)

**SOLUTION:**
Find the slope of the line containing the given points.

\[
m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{4 - (-4)}{2 - (-2)} = \frac{8}{4} = 2
\]

Use the slope and either of the two points to find the \(y\)-intercept.

\[
y = mx + b
\]
\[-4 = 2(-2) + b
\]
\[-4 = -4 + b
\]
\[0 = b
\]

Write the equation in slope-intercept form.

\[
y = mx + b
\]
\[y = 2x + 0
\]
\[y = 2x
\]
4-2 Writing Equations in Slope-Intercept Form

22. **CCSS MODELING** Greg is driving a remote control car at a constant speed. He starts the timer when the car is 5 feet away. After 2 seconds the car is 35 feet away.

a. Write a linear equation to find the distance \( d \) of the car from Greg.

b. Estimate the distance the car has traveled after 10 seconds.

**SOLUTION:**

a. Let \( t \) be the number of seconds after the timer starts. Let \( d \) be the distance traveled by the car.
The \( d \)-intercept is 5, because the car has traveled that far when the time starts at 0. Use the slope-intercept form to find the slope, which is distance divided by time, or the speed of the car.

\[
d = mt + b
\]

\[
35 = m(2) + 5
\]

\[
30 = 2m
\]

\[
\frac{30}{2} = \frac{2m}{2}
\]

\[
15 = m
\]

Write the equation in slope-intercept form with \( t \) as \( x \) and \( d \) as \( y \).

\[
y = mx + b
\]

\[
d = 15t + 5
\]

The distance of the car from Greg can be represented by the linear equation \( d = 15t + 5 \).

b. Solve for \( d \) when \( t = 10 \).

\[
d = 15t + 5
\]

\[
d = 15(10) + 5
\]

\[
d = 150 + 5
\]

\[
d = 155
\]

So, the distance the car has traveled after 10 seconds is 155 ft.
23. **ZOOS** In 2006, the attendance at the Columbus Zoo and Aquarium was about 1.6 million. In 2009, the zoo’s attendance was about 2.2 million.

a. Write a linear equation to find the attendance (in millions) \( y \) after \( x \) years. Let \( x \) be the number of years since 2000.

b. Estimate the zoo’s attendance in 2020.

**SOLUTION:**

a. The attendance increased from 1.6 million to 2.2 million, so it increased by \( 2.2 - 1.6 \) or 0.6 million. This increase took 3 years, so the increase per year is \( 0.6 \div 3 \) or 0.2. This represents the slope. We want \( x \) to represent the year 2000, so we need to find the corresponding \( y \)-intercept. Use the coordinate (6, 1.6) for 2006 since \( x = 6 \) represents 2006.

\[
y = mx + b \quad \text{Slope-intercept form}
\]

\[
1.6 = 0.2(6) + b \quad m = 0.2, y = 1.6, \text{ and } x = 6
\]

\[
1.6 = 1.2 + b \quad \text{Simplify.}
\]

\[
1.6 - 1.2 = 1.2 - 1.2 + b \quad \text{Subtract 1.2 from each side.}
\]

\[
0.4 = b \quad \text{Simplify.}
\]

The linear equation for attendance is \( y = 0.2x + 0.4 \).

b. Substitute 20 for \( x \).

\[
y = 0.2x + 0.4 \quad \text{Original equation}
\]

\[
y = 0.2(20) + 0.4 \quad \text{Replace } x \text{ with 20}
\]

\[
y = 4 + 0.4 \quad \text{Simplify.}
\]

\[
y = 4.4 \quad \text{Simplify.}
\]

The estimated attendance for 2020 is 4.4 million.
4-2 Writing Equations in Slope-Intercept Form

24. BOOKS In 1904, a dictionary cost 30¢. Since then the cost of a dictionary has risen an average of 6¢ per year.
   a. Write a linear equation to find the cost $C$ of a dictionary $y$ years after 2004.
   b. If this trend continues, what will the cost of a dictionary be in 2020?

**SOLUTION:**

a. Let $y$ be the number of years since 1904. The $C$-intercept is 30, because that was the cost of a dictionary in the $y = 0$ year, 1904. The slope is 6 as it represents the rate of increase in price. Write the equation in slope-intercept form with $y$ as $x$ and $C$ as $y$.

\[
y = mx + b
\]
\[
C = 6y + 30
\]

The cost of a dictionary after $y$ years can be represented by the linear equation $C = 30 + 6y$.

b. The year 2020 occurs 116 years after 1904, so solve for $C$ when $y = 116$.

\[
C = 30 + 6y
\]
\[
C = 30 + 6(116)
\]
\[
C = 30 + 696
\]
\[
C = 726
\]

So, if the trend continues, the cost of a dictionary in 2020 will be 726¢, or $7.26.

**Write an equation of the line that passes through the given point and has the given slope.**

25. (4, 2), slope \( \frac{1}{2} \)

**SOLUTION:**

Find the $y$-intercept.

\[
y = mx + b
\]
\[
2 = \frac{1}{2}(4) + b
\]
\[
2 = 2 + b
\]
\[
0 = b
\]

Write the equation in slope-intercept form.

\[
y = mx + b
\]
\[
y = \frac{1}{2}x
\]
26. (3, −2), slope \( \frac{1}{3} \)

**SOLUTION:**
Find the y-intercept.

\[
y = mx + b
\]

\[-2 = \frac{1}{3}(3) + b
\]

\[-2 = 1 + b
\]

\[-3 = b
\]

Write the equation in slope-intercept form.

\[
y = mx + b
\]

\[y = \frac{1}{3}x - 3
\]

27. (6, 4), slope \(-\frac{3}{4}\)

**SOLUTION:**
Find the y-intercept.

\[
y = mx + b
\]

\[4 = -\frac{3}{4}(6) + b
\]

\[4 = -\frac{9}{2} + b
\]

\[\frac{17}{2} = b
\]

\[8 \frac{1}{2} = b
\]

Write the equation in slope-intercept form.

\[
y = mx + b
\]

\[y = -\frac{3}{4}x + 8 \frac{1}{2}
\]
28. \((2, -3), \text{ slope } \frac{2}{3}\)

**SOLUTION:**
Find the \(y\)-intercept.
\[
y = mx + b
\]
\[
-3 = \frac{2}{3}(2) + b
\]
\[
-3 = \frac{4}{3} + b
\]
\[
-3 - \frac{4}{3} = b
\]
\[
-4\frac{1}{3} = b
\]
Write the equation in slope-intercept form.
\[
y = mx + b
\]
\[
y = \frac{2}{3}x - 4\frac{1}{3}
\]

29. \((2, -2), \text{ slope } \frac{2}{7}\)

**SOLUTION:**
Find the \(y\)-intercept.
\[
y = mx + b
\]
\[
-2 = \frac{2}{7}(2) + b
\]
\[
-2 = \frac{4}{7} + b
\]
\[
-2 - \frac{4}{7} = b
\]
Write the equation in slope-intercept form.
\[
y = mx + b
\]
\[
y = \frac{2}{7}x - 2\frac{4}{7}
\]
4-2 Writing Equations in Slope-Intercept Form

30. \((-4, -2), \text{ slope } -\frac{3}{5}\)

**SOLUTION:**
Find the y-intercept.

\[
y = mx + b \\
-2 = -\frac{3}{5}(-4) + b \\
-2 = \frac{12}{5} + b \\
-\frac{22}{5} = b \\
-4\frac{2}{5} = b
\]

Write the equation in slope-intercept form.

\[
y = mx + b \\
y = -\frac{3}{5}x - 4\frac{2}{5}
\]

31. **DOGS** In 2001, there were about 56.1 thousand golden retrievers registered in the United States. In 2002, the number was 62.5 thousand.

a. Write a linear equation to find the number of golden retrievers \(G\) that will be registered in year \(t\), where \(t = 0\) is the year 2000.

b. Graph the equation.

c. Estimate the number of golden retrievers that will be registered in 2017.

**SOLUTION:**
a. Two points on the line are \((1, 56.1)\) and \((2, 62.5)\). Find the slope of the line.

\[
m = \frac{y_2 - y_1}{x_2 - x_1} \\
= \frac{62.5 - 56.1}{2 - 1} \\
= \frac{6.4}{1} \\
= 6.4
\]

Let \(t\) be the number of years after 2000. Use the slope-intercept form and one of the points to find the y-intercept for \(t = 0\) year, 2000.

\[
62.5 = 6.4(2) + b \\
62.5 = 12.8 + b \\
49.7 = b
\]

Write the equation in slope-intercept form.
4-2 Writing Equations in Slope-Intercept Form

\[ y = mx + b \]
\[ G = 6.4t + 49.7 \]

The number of golden retrievers that will be registered in the year \( t \) can be represented by the linear equation \( G = 6.4t + 49.7 \).

b. Plot points and draw a line through them.

c. Solve for \( G \) when \( t = 17 \).

\[
G = 6.4t + 49.7 \\
= 6.4(17) + 49.7 \\
= 108.8 + 49.7 \\
= 158.5
\]

So, the number of golden retrievers that will be registered in 2017 is estimated to be 158.5 thousand, or 158,500.
32. **GYM MEMBERSHIPS**  A local recreation center offers a yearly membership for $265. The center offers aerobics classes for an additional $5 per class.

a. Write an equation that represents the total cost of the membership.

b. Carly spent $500 one year. How many aerobics classes did she take?

**SOLUTION:**

a. Let $y$ = the total cost of membership and $x$ = the number of additional classes taken. The y-intercept is the yearly fee of 265. The slope is 5 as it represents the fixed rate per additional class. Write the equation in slope-intercept form.

$$y = mx + b$$

$$y = 5x + 265$$

So, the total cost of the membership can be represented by the linear equation $y = 5x + 265$.

b. 

$$y = 5x + 265 \quad \text{Original equation}$$

$$500 = 5x + 265 \quad \text{Replace } y \text{ with 500.}$$

$$500 - 265 = 5x + 265 - 265 \quad \text{Subtract 265 from each side.}$$

$$235 = 5x \quad \text{Simplify.}$$

$$\frac{235}{5} = \frac{5x}{5} \quad \text{Divide each side by 5.}$$

$$47 = x \quad \text{Simplify.}$$

Therefore, she paid for 47 classes.
33. **SUBSCRIPTION** A magazine offers an online subscription that allows you to view up to 25 archived articles free. To view 30 archived articles, you pay $49.15. To view 33 archived articles, you pay $57.40.

**a.** What is the cost of each archived article for which you pay a fee?

**b.** What is the cost of the magazine subscription?

**SOLUTION:**

**a.** The cost of each archived article can be found by finding the slope using the two points (30, 49.15) and (33, 57.40).

\[
m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{57.40 - 49.15}{33 - 30} = \frac{8.25}{3} = 2.75
\]

So, the cost of each archived article is $2.75.

**b.** The cost of the magazine subscription is the y-intercept. Use the slope-intercept form and one of the points to find the y-intercept for \(x = 5\) (five additional articles).

\[
y = mx + b
\]

\[
49.15 = 2.75(5) + b
\]

\[
49.15 = 13.75 + b
\]

\[
35.40 = b
\]

So, the cost of the magazine subscription is $35.40.
4-2 Writing Equations in Slope-Intercept Form

Write an equation of the line that passes through the given points.
34. (5, –2), (7, 1)

**SOLUTION:**
Find the slope of the line containing the given points.

\[
m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1 - (-2)}{7 - 5} = \frac{3}{2} = 1 \frac{1}{2}
\]

Use the slope and either of the two points to find the y-intercept.

\[
y = mx + b
\]

\[
-2 = \frac{3}{2} (5) + b
\]

\[
-2 = 7 \frac{1}{2} + b
\]

\[
-9 \frac{1}{2} = b
\]

Write the equation in slope-intercept form.

\[
y = mx + b
\]

\[
y = \frac{3}{2} x - 9 \frac{1}{2}
\]
35. (5, –3), (2, 5)

**SOLUTION:**
Find the slope of the line containing the given points.

\[
m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{5 - (-3)}{2 - 5} = \frac{8}{-3} = -2 \frac{2}{3}
\]

Use the slope and either of the two points to find the \(y\)-intercept.

\[
y = mx + b
\]

\[
-3 = -2 \frac{2}{3} (5) + b
\]

\[
-3 = -13 \frac{1}{3} + b
\]

\[
10 \frac{1}{3} = b
\]

Write the equation in slope-intercept form.

\[
y = mx + b
\]

\[
y = -2 \frac{2}{3} x + 10 \frac{1}{3}
\]
4-2 Writing Equations in Slope-Intercept Form

36. \((\frac{5}{4}, 1), (\frac{-1}{4}, \frac{3}{4})\)

**SOLUTION:**
Find the slope of the line containing the given points.

\[
m = \frac{y_2 - y_1}{x_2 - x_1}
\]

\[
m = \frac{\frac{3}{4} - 1}{\frac{-1}{4} - \frac{5}{4}}
\]

\[
m = \frac{-\frac{1}{4}}{-\frac{1}{4} - \frac{5}{4}}
\]

\[
m = \frac{-\frac{1}{4}}{-\frac{6}{4}}
\]

\[
m = \frac{1}{6}
\]

Use the slope and either of the two points to find the y-intercept.

\[
y = mx + b
\]

\[
1 = \frac{1}{6}\left(\frac{5}{4}\right) + b
\]

\[
1 = \frac{5}{24} + b
\]

\[
\frac{24}{24} - \frac{5}{24} = b
\]

\[
\frac{19}{24} = b
\]

Write the equation in slope-intercept form.

\[
y = mx + b
\]

\[
y = \frac{1}{6}x + \frac{19}{24}
\]
4-2 Writing Equations in Slope-Intercept Form

37. \((\frac{5}{12}, -1), (\frac{-3}{4}, \frac{1}{6})\)

**SOLUTION:**
Find the slope of the line containing the given points.

\[
m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\frac{1}{6} - (-1)}{\frac{-3}{4} - \frac{5}{12}} = \frac{\frac{7}{6}}{\frac{14}{12}} = \frac{7}{6} \cdot \left( -\frac{12}{14} \right) = -1
\]

Use the slope and either of the two points to find the y-intercept.

\[
y = mx + b
\]
\[
-1 = -1(\frac{5}{12}) + b
\]
\[
-1 = -\frac{5}{12} + b
\]
\[
-\frac{7}{12} = b
\]

Write the equation in slope-intercept form.

\[
y = mx + b
\]
\[
y = -x - \frac{7}{12}
\]

**Determine whether the given point is on the line. Explain why or why not.**

38. \((3, -1); \ y = \frac{1}{3}x + 5\)

**SOLUTION:**
If the point is on the line, then inputting the x-value into the equation will yield the y-value. Try substituting 3 and -1 for x and y.

\[
-1 = \frac{1}{3} (3) + 5
\]
\[
-1 = 1 + 5
\]
\[
-1 = 6
\]
The equation is not true, so the point is not on the line.
4-2 Writing Equations in Slope-Intercept Form

39. (6, -2); \( y = \frac{1}{2}x - 5 \)

**SOLUTION:**
If the point is on the line, then inputting the \( x \)-value into the equation will yield the \( y \)-value.
Try substituting 6 and -2 for \( x \) and \( y \).

\[
-2 = \frac{1}{2}(6) - 5 \\
-2 = 3 - 5 \\
-2 = -2
\]
The equation is true, so the point is on the line.

**Determine which equation best represents each situation. Explain the meaning of each variable.**

A  \( y = -\frac{1}{3}x + 72 \)

B  \( y = 2x + 225 \)

C  \( y = 8x + 4 \)

40. **CONCERTS**  Tickets to a concert cost $8 each plus a processing fee of $4 per order.

**SOLUTION:**
The equation in choice C is best because the cost of each ticket, 8, is the slope, and the processing fee, 4 is the \( y \)-intercept. \( x \) represents the number of tickets per order and \( y \) represents the total cost of an order.

41. **FUNDRAISING**  The freshman class has $225. They sell raffle tickets at $2 each to raise money for a field trip.

**SOLUTION:**
The equation in choice B is best because the cost of each ticket, 2, is the slope, and the amount in the class treasury before the fund-raiser, 225, is the \( y \)-intercept. \( x \) represents the number of raffle tickets sold, \( y \) represents the total amount of money in the treasury.

42. **POOLS**  The current water level of a swimming pool in Tucson, Arizona, is 6 feet. The rate of evaporation is \( \frac{1}{3} \) inch per day.

**SOLUTION:**
The equation in choice A is best because the rate of evaporation, \( -\frac{1}{3} \), is the slope. Six feet is the same as 72 inches, so the beginning water level of the pool, 72, is the \( y \)-intercept. \( x \) represents the number of days since summer began, \( y \) represents the total depth of water in the pool in inches.
4-2 Writing Equations in Slope-Intercept Form

43. **CCSS SENSE-MAKING** A manufacturer implemented a program to reduce waste. In 1998 they sent 946 tons of waste to landfills. Each year after that, they reduced their waste by an average 28.4 tons.

a. How many tons were sent to the landfill in 2010?

b. In what year will it become impossible for this trend to continue? Explain.

**SOLUTION:**

a. Write an equation in slope-intercept form: \( y = -28.4x + 946 \). Solve for \( y \) where \( x \) represents the number of years since 1998 when the program was implemented.

\[
y = -28.4x + 946 \quad \text{Original equation}
\]
\[
y = -28.4(12) + 946 \quad \text{Replace } x \text{ with } 12.
\]
\[
y = -340.8 + 946 \quad \text{Add } 946 \text{ to each side}
\]
\[
y = 605.2 \quad \text{Simplify.}
\]

So, 605.2 tons were sent to the landfill in 2010.

b. When the waste sent (\( y \)) is 0, a continued trend of reducing waste would be impossible, because a negative amount of waste is impossible. Solve for \( x \) when \( y = 0 \).

\[
y = -28.4x + 946 \quad \text{Original equation}
\]
\[
0 = -28.4x + 946 \quad \text{Replace } y \text{ with } 0.
\]
\[
28.4x = -28.4x + 28.4x + 946 \quad \text{Add } 28.4x \text{ to each side.}
\]
\[
28.4x = 946 \quad \text{Simplify.}
\]
\[
\frac{28.4x}{28.4} = \frac{946}{28.4} \quad \text{Divide each side by } 28.4.
\]
\[
x = 33.30986 \quad \text{Simplify.}
\]

It would take over 33 years for the waste to equal 0 tons, so then it would become impossible for the trend to continue in 2032.
4-2 Writing Equations in Slope-Intercept Form

44. **COMBINING FUNCTIONS** The parents of a college student open an account for her with a deposit of $5000, and they set up automatic deposits of $100 to the account every week.

   a. Write a function \( d(t) \) to express the amount of money in the account \( t \) weeks after the initial deposit. \( d(t) = 5000 + 100t \)

   b. The student plans on spending $600 the first week and $250 in each of the following weeks for room and board and other expenses. Write a function \( w(t) \) to express the amount of money taken out of the account each week.

   c. Find \( B(t) = d(t) - w(t) \). What does this new function represent?

   **SOLUTION:**

   a. Let \( d = \) the amount of money in the account and \( t = \) the number of weeks after the initial deposit. The \( y \)-intercept is the initial deposit of $5000. The slope is 100 as it represents the fixed rate of increase in the account. Write the equation in slope-intercept form.

   \[
   y = mx + b
   \]

   \[
   d(t) = 100t + 5000
   \]

   b. Let \( w = \) the amount of money taken out of the account and \( t = \) the number of weeks after the first amount is removed. The \( y \)-intercept is the initial amount taken out of $600. The slope is the 250 as it represents the fixed rate of increase in the amount removed from the account. Write in slope-intercept form.

   \[
   y = mx + b
   \]

   \[
   w(t) = 250t + 600
   \]

   c. \( B(t) = d(t) - w(t) \)

   \[
   B(t) = (100t + 5000) - (250t + 600)
   \]

   \[
   B(t) = 4400 - 150t
   \]

   The new function represents the amount remaining in the account at time \( t \)

   d. The student will run out of money when the amount remaining in the account equals 0.

   \[
   B(t) = 4400 - 150t \quad \text{Balance function}
   \]

   \[
   0 = 4400 - 150t \quad B(t) = 0
   \]

   \[
   150t = 4400 \quad \text{Add 150t to each side.}
   \]

   \[
   t \approx 29.33 \quad \text{Divide each side by 150.}
   \]

   So, the student will run out of money in about 29 weeks.
4-2 Writing Equations in Slope-Intercept Form

45. CONCERT TICKETS  Jackson is ordering tickets for a concert online. There is a processing fee for each order, and the tickets are $52 each. Jackson ordered 5 tickets and the cost was $275.

a. Determine the processing fee. Write a linear equation to represent the total cost $C$ for $t$ tickets.

b. Make a table of values for at least three other numbers of tickets.

c. Graph this equation. Predict the cost of 8 tickets.

SOLUTION:
a. To determine the amount of the processing fee, find the $y$-intercept.

$$y = mx + b$$

$$275 = 52(5) + b$$

$$275 = 260 + b$$

$$275 - 260 = 260 - 260 + b$$

$$15 = b$$

So, the fee is $15.

b. The total cost for the tickets can be represented by the linear equation $C = 52t + 15$.

<table>
<thead>
<tr>
<th>$t$</th>
<th>$C = 52t + 15$</th>
<th>$C$</th>
<th>$(t, C)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>$C(3) = 52(3) + 15$</td>
<td>174</td>
<td>(3, 174)</td>
</tr>
<tr>
<td>4</td>
<td>$C(4) = 52(4) + 15$</td>
<td>223</td>
<td>(4, 223)</td>
</tr>
<tr>
<td>6</td>
<td>$C(6) = 52(6) + 15$</td>
<td>327</td>
<td>(6, 327)</td>
</tr>
<tr>
<td>7</td>
<td>$C(7) = 52(7) + 15$</td>
<td>379</td>
<td>(7, 379)</td>
</tr>
</tbody>
</table>

c. To graph the equation, plot the values from the table in part b. Draw a line through the points.

The cost to order 8 tickets should be another $52 more than the cost of 7 tickets. So, the cost is $379 + 52$ or $431.$
4-2 Writing Equations in Slope-Intercept Form

46. MUSIC  A music store is offering a Frequent Buyers Club membership. The membership costs $22 per year, and then a member can buy CDs at a reduced price. If a member buys 17 CDs in one year, the cost is $111.25.

a. Determine the cost of each CD for a member.

b. Write a linear equation to represent the total cost $y$ of a one year membership, if $x$ CDs are purchased.

c. Graph this equation.

**SOLUTION:**

a. Write an equation in slope-intercept form to find the cost of each CD for a member where $y = 111.25$, $x = 17$, and $b = 22$. Then, solve for $m$.

\[
y = mx + b \\
111.25 = m(17) + 22 \\
89.25 = 17m \\
\frac{89.25}{17} = 17m \\
5.25 = m \\
\]

So, the cost of each CD for a member is $5.25.

b. The total cost of a one-year membership if $x$ CDs are purchased, can be represented by the linear equation $y = 5.25x + 22$.

c. To graph the equation, plot the $y$-intercept $(0, 22)$ and the point $(17, 111.25)$. Draw a line through the points.
4-2 Writing Equations in Slope-Intercept Form

47. ERROR ANALYSIS   Tess and Jacinta are writing an equation of the line through (3, –2) and (6, 4). Is either of them correct? Explain your reasoning.

**SOLUTION:**
Jacinta is correct. Both found the slope correctly. However, Tess switched the x- and y-coordinates on the point that she entered in step 3.
4-2 Writing Equations in Slope-Intercept Form

48. **CHALLENGE**  Consider three points, (3, 7), (−6, 1) and (9, p), on the same line. Find the value of p and explain your steps.

**SOLUTION:**

Find the slope of the line containing the first two points.

\[
m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1 - 7}{-6 - 3} = \frac{-6}{-9} = \frac{2}{3}
\]

Use the slope and either of the first two points to solve for \(p\). Let \((x_1, y_1)\) be (9, \(p\)) and \((x_2, y_2)\) be (−6, 1).

\[
m = \frac{y_2 - y_1}{x_2 - x_1} \quad \text{Slope formula.}
\]

\[
\frac{2}{3} = \frac{1 - p}{-6 - 9} \quad \text{Substitute.}
\]

\[
\frac{2}{3} = \frac{1 - p}{-15} \quad \text{Simplify.}
\]

\[
\frac{2}{3} \cdot (-15) = \frac{1 - p}{-15} \cdot (-15) \quad \text{Multiply each side by } -15.
\]

\[
-10 = 1 - p \quad \text{Simplify.}
\]

\[
-10 - 1 = 1 - 1 - p \quad \text{Subtract 1 to each side}
\]

\[
-11 = -p \quad \text{Simplify.}
\]

\[
11 = p \quad \text{Divide each side by } -1.
\]
49. **REASONING** Consider the standard form of a linear equation, $Ax + By = C$.

a. Rewrite equation in slope-intercept form.

b. What is the slope?

c. What is the $y$-intercept?

d. Is this true for all real values of $A$, $B$, and $C$?

**SOLUTION:**

a. 

$$Ax + By = C$$

$$Ax - Ax + By = C - Ax$$

$$By = -Ax + C$$

$$\frac{By}{B} = \frac{-Ax + C}{B}$$

$$y = -\frac{A}{B}x + \frac{C}{B}$$

b. The slope is $-\frac{A}{B}$.

c. The $y$-intercept is $\frac{C}{B}$.

d. No, $B$ cannot equal zero.

50. **OPEN ENDED** Create a real-world situation that fits the graph shown. Define the two quantities and describe the functional relationship between them. Write an equation to represent this relationship and describe what the slope and $y$-intercept mean.

![Graph](image)

**SOLUTION:**

Sample answer: Let $y$ represent the number of quarts of water in a pitcher, and let $x$ represent the time in seconds that water is pouring from the pitcher. As time increases by 1 second, the amount of water in the pitcher decreases by $\frac{1}{2}$ qt. An equation is $y = -\frac{1}{2}x + 4$. The slope is the rate at which the water is leaving the pitcher, $\frac{1}{2}$ quart per second. The $y$-intercept represents the amount of water in the pitcher when it is full, 4 qt.
4-2 Writing Equations in Slope-Intercept Form

51. WRITING IN MATH  Linear equations are useful in predicting future events. Describe some factors in real-world situations that might affect the reliability of the graph in making any predictions.

SOLUTION:
Linear equations can be use to predict something that has a constant of rate of change. If the problem is about something that could suddenly change, such as weather or prices, the graph could suddenly spike up.

52. CCSS ARGUMENTS  What information is needed to write the equation of a line? Explain.

SOLUTION:
To write the equation of a line, you need to know the slope and y-intercept of the line. You can also write the equation of a line if you have the slope and the coordinates of another point on the line, or the coordinates of two points on the graph.

53. Which equation best represents the graph?

A  \( y = 2x \)

B  \( y = -2x \)

C  \( y = \frac{1}{2}x \)

D  \( y = -\frac{1}{2}x \)

SOLUTION:
The equation that best represents the graph is \( y = -\frac{1}{2}x \), because the slope of the graph moves down one unit and right two units, or \(-\frac{1}{2}\). So, the correct choice is D.
4-2 Writing Equations in Slope-Intercept Form

54. Roberto receives an employee discount of 12%. If he buys a $355 item at the store, what is his discount to the nearest dollar?

F $3
G $4
H $30
J $43

**SOLUTION:**
\[ d = 0.12 \cdot 355 \]
\[ d = 42.6 \]

Rounded to the nearest dollar, the discount is $43.

So, the correct choice is J.
4-2 Writing Equations in Slope-Intercept Form

55. GEOMETRY The midpoints of the sides of the large square are joined to form a smaller square. What is the area of the smaller square?

A 64 cm²
B 128 cm²
C 248 cm²
D 256 cm²

SOLUTION:
Let the length of a side of the smaller square be represented by \( c \). So, the formula for area of the square would be \( A = c^2 \). Use the Pythagorean theorem to find the length of a side of the smaller square.

\[
\begin{align*}
   a^2 + b^2 &= c^2 \\
   (8)^2 + (8)^2 &= c^2 \\
   64 + 64 &= c^2 \\
   128 &= c^2
\end{align*}
\]

So, since \( A = c^2 \), \( A = 128 \). The correct choice is B.
4-2 Writing Equations in Slope-Intercept Form

56. SHORT RESPONSE  If \( \frac{5(x+4)}{2} + 7 = 37 \), what is the value of \( 3x - 9 \)?

**SOLUTION:**

Solve for \( x \).

\[
\frac{5(x+4)}{2} + 7 = 37 \quad \text{Original equation}
\]

\[
\frac{5(x+4)}{2} + 7 - 7 = 37 - 7 \quad \text{Subtract 7 from each side.}
\]

\[
\frac{5(x+4)}{2} = 30 \quad \text{Simplify.}
\]

\[
2 \left( \frac{5(x+4)}{2} \right) = 2(30) \quad \text{Multiply each side by 2.}
\]

\[
5(x+4) = 60 \quad \text{Simplify.}
\]

\[
\frac{5(x+4)}{5} = \frac{60}{5} \quad \text{Divide each side by 5.}
\]

\[
x + 4 = 12 \quad \text{Simplify.}
\]

\[
x + 4 - 4 = 12 - 4 \quad \text{Subtract 4 from each side.}
\]

\[
x = 8 \quad \text{Simplify.}
\]

Substitute 8 for \( x \) in the expression.

\[
3x - 9 = 3(8) - 9 \quad \text{Replace } x \text{ with } 8.
\]

\[
= 24 - 9 \quad \text{Simplify.}
\]

\[
= 15 \quad \text{Simplify.}
\]

**Graph each equation.**

57. \( y = 3x + 2 \)

**SOLUTION:**

To graph the equation, plot the \( y \)-intercept \((0, 2)\). Then move up 3 units and right 1 unit. Plot the point. Draw a line through the two points.
4-2 Writing Equations in Slope-Intercept Form

58. \( y = -4x + 2 \)

**SOLUTION:**
To graph the equation, plot the \( y \)-intercept (0, 2). Then move down 4 units and right 1 unit. Plot the point. Draw a line through the two points.

![Graph of y = -4x + 2]

59. \( 3y = 2x + 6 \)

**SOLUTION:**
Write the equation in slope-intercept form.

\[
3y = 2x + 6 \\
\frac{3y}{3} = \frac{2x + 6}{3} \\
y = \frac{2}{3}x + 2
\]

To graph the equation, plot the \( y \)-intercept (0, 2). Then move up 2 units and right 3 units. Plot the point. Draw a line through the two points.

![Graph of 3y = 2x + 6]
4-2 Writing Equations in Slope-Intercept Form

60. \( y = \frac{1}{2} x + 6 \)

**SOLUTION:**
To graph the equation, plot the \( y \)-intercept \((0, 6)\). Then move up 1 unit and right 2 units. Plot the point. Draw a line through the two points.

![Graph](image)

61. \( 3x + y = -1 \)

**SOLUTION:**
Write the equation in slope-intercept form.

\[
3x + y = -1 \\
3x - 3x + y = -3x - 1 \\
y = -3x - 1
\]

To graph the equation, plot the \( y \)-intercept \((0, -1)\). Then move down 3 units and right 1 unit. Plot the point. Draw a line through the two points.

![Graph](image)
4-2 Writing Equations in Slope-Intercept Form

62. \(2x + 3y = 6\)

**SOLUTION:**
Write the equation in slope-intercept form.

\[
\begin{align*}
2x + 3y &= 6 \\
2x - 2x + 3y &= -2x + 6 \\
\frac{3y}{3} &= \frac{-2x + 6}{3} \\
y &= \frac{-2}{3} + 2
\end{align*}
\]

To graph the equation, plot the \(y\)-intercept \((0, 2)\). Then move down 2 units and right 3 units. Plot the point. Draw a line through the two points.

![Graph of the equation](image)

Write an equation in function notation for each relation.

63. **SOLUTION:**
Looking at the graph, the \(y\)-intercept is 0, and the slope is \(-2\) (down 2 units, right 1 unit). Write the linear equation in slope-intercept form. Then, write as a function of \(x\).

\[
\begin{align*}
y &= mx + b \\
y &= -2x \\
f(x) &= -2x
\end{align*}
\]
64.

**SOLUTION:**

Looking at the graph, the \( y \)-intercept is 0, and the slope is \( \frac{1}{2} \) (up 1 unit, right 2 units). Write the linear equation in slope-intercept form. Then, write as a function of \( x \).

\[
\begin{align*}
y &= mx + b \\
y &= \frac{1}{2}x \\
f(x) &= \frac{1}{2}x
\end{align*}
\]
4-2 Writing Equations in Slope-Intercept Form

65. **METEOROLOGY** The distance $d$ in miles that the sound of thunder travels in $t$ seconds is given by the equation $d = 0.21t$.

a. Graph the equation.

b. Use the graph to estimate how long it will take you to hear thunder from a storm 3 miles away.

**SOLUTION:**
a. In the equation, the $y$-intercept is 0 and the slope is 0.21. To graph the equation, plot the $y$-intercept (0, 0). Make a table of values to add a few more points.

<table>
<thead>
<tr>
<th>$x$</th>
<th>$y$</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>1.05</td>
</tr>
<tr>
<td>10</td>
<td>2.10</td>
</tr>
<tr>
<td>15</td>
<td>3.15</td>
</tr>
<tr>
<td>20</td>
<td>4.20</td>
</tr>
</tbody>
</table>

b. Follow the line of the graph until $y = 3$. The $x$-coordinate is about 14. So, according to the graph, it will take you about 14 seconds to hear thunder from a storm 3 miles away.

**Solve each equation. Check your solution.**

66. $-5t - 2.2 = -2.9$

**SOLUTION:**
Solve.

$-5t - 2.2 = -2.9$

$-5t - 2.2 + 2.2 = -2.9 + 2.2$

$-5t = -0.7$

$\frac{-5t}{-5} = \frac{-0.7}{-5}$

$t = 0.14$

Check.

$-5(0.14) - 2.2 \neq -2.9$

$-0.7 - 2.2 \neq -2.9$

$-2.9 = -2.9 \checkmark$
4-2 Writing Equations in Slope-Intercept Form

67. 

\[-5.5a - 43.9 = 77.1\]

**SOLUTION:**
Solve.
\[-5.5a - 43.9 + 43.9 = 77.1 + 43.9\]
\[-5.5a = 121\]
\[-5.5\]
\[\frac{-5.5a}{-5.5} = \frac{121}{-5.5}\]
\[a = -22\]
Check.
\[-5.5( -22) - 43.9 = 77.1\]
\[121 - 43.9 = 77.1\]
\[77.1 = 77.1\]

68. 

\[4.2r + 7.14 = 12.6\]

**SOLUTION:**
Solve.
\[4.2r + 7.14 = 12.6\]
\[4.2r + 7.14 - 7.14 = 12.6 - 7.14\]
\[4.2r = 5.46\]
\[\frac{4.2r}{4.2} = \frac{5.46}{4.2}\]
\[r = 1.3\]
Check.
\[4.2r + 7.14 = 12.6\]
\[4.2(1.3) + 7.14 = 12.6\]
\[5.46 + 7.14 = 12.6\]
\[12.6 = 12.6\]
69. \[-14 - \frac{n}{9} = 9\]

**SOLUTION:**
Solve.
\[
-14 - \frac{n}{9} = 9 \\
-14 + 14 - \frac{n}{9} = 9 + 14 \\
-\frac{n}{9} = 23 \\
-9\left(\frac{-n}{9}\right) = -9(23) \\
n = -207
\]
Check.
\[
-14 - \frac{-207}{9} \overset{?}{=} 9 \\
-14 + 23 \overset{?}{=} 9 \\
9 = 9 \checkmark
\]
70. \[-\frac{8b - (-9)}{-10} = 17\]

**SOLUTION:**
Solve.
\[
\frac{-8b - (-9)}{-10} = 17 \\
-10\left(\frac{-8b - (-9)}{-10}\right) = -10(17) \\
-8b + 9 = -170 \\
-8b + 9 - 9 = -170 - 9 \\
-8b = -179 \\
\frac{-8b}{-8} = \frac{-179}{-8} \\
b = 22.375
\]
Check.
\[
\frac{-8b - (-9)}{-10} \overset{?}{=} 17 \\
\frac{-8(22.375) - (-9)}{-10} \overset{?}{=} 17 \\
\frac{-179 - (-9)}{-10} \overset{?}{=} 17 \\
\frac{-170}{-10} \overset{?}{=} 17 \\
17 = 17 \checkmark
4-2 Writing Equations in Slope-Intercept Form

71. 9.5x + 11 - 7.5x = 14

**SOLUTION:**
Solve.
9.5x + 11 - 7.5x = 14

\[
2x + 11 = 14
\]

\[
2x + 11 - 11 = 14 - 11
\]

\[
x = 3
\]

\[
\frac{2x}{2} = \frac{3}{2}
\]

\[
x = 1.5
\]

Check.
9.5x + 11 - 7.5x = 14
9.5(1.5) + 11 - 7.5(1.5) = 14

14.25 + 11 - 11.25 = 14

14 = 14

Find the value of \( r \) so the line through each pair of points has the given slope.
72. (6, -2), (r, -6), \( m = 4 \)

**SOLUTION:**
Solve for \( r \) using the formula for slope. Replace \( m \) with 4, \((x_1, y_1)\) with (6, -2), and \((x_2, y_2)\) with (4, -6).

\[
m = \frac{y_2 - y_1}{x_2 - x_1} \quad \text{Slope Formula}
\]

\[
4 = \frac{-6 - (-2)}{r - 6}
\]

Substitute.

\[
4 = \frac{-4}{r - 6}
\]

Simplify.

\[
4(r - 6) = (r - 6)\left(\frac{-4}{r - 6}\right)
\]

Multiply.

\[
4(r - 6) = -4
\]

Distributive Property

\[
4r - 24 = -4
\]

Simplify.

\[
4r - 24 + 24 = -4 + 24
\]

Add 24 to each side.

\[
4r = 20
\]

Simplify.

\[
\frac{4r}{4} = \frac{20}{4}
\]

Divide each side by 4.

\[
r = 5
\]

Simplify.
4-2 Writing Equations in Slope-Intercept Form

73. (8, 10), (r, 4), m = 6

**SOLUTION:**
Solve for \(r\) using the formula for slope.

\[
m = \frac{y_2 - y_1}{x_2 - x_1} \quad \text{Slope formula}
\]

\[
6 = \frac{4 - 10}{r - 8} \quad \text{Substitute.}
\]

\[
6 = \frac{-6}{r - 8} \quad \text{Simplify.}
\]

\[
6(r - 8) = (r - 8)\left(\frac{-6}{r - 8}\right) \quad \text{Multiply.}
\]

\[
6(r - 8) = -6 \quad \text{Simplify.}
\]

\[
6r - 48 = -6 \quad \text{Distributive Property}
\]

\[
6r - 48 + 48 = -6 + 48 \quad \text{Add 48 to each side.}
\]

\[
6r = 42 \quad \text{Simplify.}
\]

\[
\frac{6r}{6} = \frac{42}{6} \quad \text{Divide.}
\]

\[
r = 7 \quad \text{Simplify.}
\]

74. (7, -10), (r, 4), m = -3

**SOLUTION:**
Solve for \(r\) using the formula for slope.

\[
m = \frac{y_2 - y_1}{x_2 - x_1} \quad \text{Slope formula}
\]

\[
-3 = \frac{4 - (-10)}{r - 7} \quad \text{Substitute.}
\]

\[
-3 = \frac{14}{r - 7} \quad \text{Simplify.}
\]

\[
-3(r - 7) = (r - 7)\left(\frac{14}{r - 7}\right) \quad \text{Multiply.}
\]

\[
-3(r - 7) = 14 \quad \text{Simplify.}
\]

\[
-3r + 21 = 14 \quad \text{Distributive Property}
\]

\[
-3r + 21 - 21 = 14 - 21 \quad \text{Subtract.}
\]

\[
-3r = -7 \quad \text{Simplify.}
\]

\[
\frac{-3r}{-3} = \frac{-7}{-3} \quad \text{Divide.}
\]

\[
r = \frac{7}{3} \quad \text{Simplify.}
\]

\[
r = 2 \frac{1}{3}
\]
4-2 Writing Equations in Slope-Intercept Form

75. (6, 2), (9, r), \( m = -1 \)

**SOLUTION:**
Solve for \( r \) using the formula for slope.

\[
m = \frac{y_2 - y_1}{x_2 - x_1} \quad \text{Slope formula}
\]

\[
-1 = \frac{9 - 6}{9 - 6}
\]

Substitute.

\[
-1 = \frac{r - 2}{3}
\]

Simplify.

\[
3(-1) = 3\left(\frac{r - 2}{3}\right)
\]

Multiply.

\[
-3 = r - 2
\]

Simplify.

\[
-3 + 2 = r - 2 + 2
\]

Add.

\[
-1 = r
\]

Simplify.

76. (9, r), (6, 3), \( m = -\frac{1}{3} \)

**SOLUTION:**
Solve for \( r \) using the formula for slope.

\[
m = \frac{y_2 - y_1}{x_2 - x_1} \quad \text{Slope formula}
\]

\[
-\frac{1}{3} = \frac{3 - r}{6 - 9}
\]

Substitute.

\[
-\frac{1}{3} = \frac{3 - r}{-3}
\]

Simplify.

\[
-3\left(-\frac{1}{3}\right) = -3\left(\frac{3 - r}{-3}\right)
\]

Multiply.

\[
1 = 3 - r
\]

Simplify.

\[
1 - 3 = 3 - 3 - r
\]

Subtract.

\[
-2 = -r
\]

Simplify.

\[
2 = r
\]

Divide.
4-2 Writing Equations in Slope-Intercept Form

77. \((5, r), (2, -3), m = \frac{4}{3}\)

**SOLUTION:**
Solve for \(r\) using the formula for slope.

\[
m = \frac{y_2 - y_1}{x_2 - x_1} \quad \text{Slope formula}
\]

\[
\frac{4}{3} = \frac{-3 - r}{2 - 5} \quad \text{Substitute.}
\]

\[
\frac{4}{3} = \frac{-3 - r}{-3} \quad \text{Simplify.}
\]

\[-3\left(\frac{4}{3}\right) = -3\left(\frac{-3 - r}{-3}\right) \quad \text{Multiply.}
\]

\[-4 = -3 - r \quad \text{Simplify.}
\]

\[-4 + 3 = -3 + 3 - r \quad \text{Add.}
\]

\[-1 = -r \quad \text{Simplify.}
\]

\[1 = r \quad \text{Divide.}
\]