Write an equation of a line in slope-intercept form with the given slope and \( y \)-intercept. Then graph the equation.

1. slope: 2, \( y \)-intercept: 4

**SOLUTION:**
The slope-intercept form of a line is \( y = mx + b \), where \( m \) is the slope, and \( b \) is the \( y \)-intercept.

\[
\begin{align*}
  y &= mx + b \quad \text{Slope-intercept form} \\
  y &= 2x + 4 \quad \text{Replace } m \text{ with } 2 \text{ and } b \text{ with } 4.
\end{align*}
\]

Plot the \( y \)-intercept (0, 4). The slope is \( \frac{\text{rise}}{\text{run}} = \frac{2}{1} \). From (0, 4), move down 2 units and left 1 unit. (Note that we can move up and to the right, or down and to the left. Normally we would move up and to the right, but moving down and to the left keeps the point near the origin.) Plot the point. Draw a line through the two points.
2. slope: $-5$, y-intercept: 3

**SOLUTION:**

The slope-intercept form of a line is $y = mx + b$, where $m$ is the slope, and $b$ is the y-intercept.

$\begin{align*}
  y &= mx + b \quad \text{Slope-intercept form} \\
  y &= -5x + 3 \quad \text{Replace } m \text{ with } -5 \text{ and } b \text{ with } 3
\end{align*}$

Plot the y-intercept $(0, 3)$. The slope is $\frac{\text{rise}}{\text{run}} = \frac{-5}{1}$. From $(0, 3)$, move down 5 units and right 1 unit. Plot the point.

Draw a line through the two points.
3. slope: $\frac{3}{4}$, y-intercept: $-1$

**SOLUTION:**
The slope-intercept form of a line is $y = mx + b$, where $m$ is the slope, and $b$ is the y-intercept.

$y = mx + b$  \textbf{Slope-intercept form}

$y = \frac{3}{4}x - 1$  \textbf{Replace} $m$ with $\frac{3}{4}$ and $b$ with $-1$.

Plot the y-intercept $(0, -1)$. The slope is $\frac{\text{rise}}{\text{run}} = \frac{3}{4}$. From $(0, -1)$, move up 3 units and right 4 units. Plot the point.

Draw a line through the two points.
4-1 Graphing Equations in Slope-Intercept Form

4. slope: \(-\frac{5}{7}\), \(y\)-intercept: \(-\frac{2}{3}\)

**SOLUTION:**
The slope-intercept form of a line is \(y = mx + b\), where \(m\) is the slope, and \(b\) is the \(y\)-intercept.

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

\[
y = -\frac{5}{7}x - \frac{2}{3} \quad \text{Replace } m \text{ with } -\frac{5}{7} \text{ and } b \text{ with } -\frac{2}{3}.
\]

Plot the \(y\)-intercept \((0, -\frac{2}{3})\) The slope is \(\frac{\text{rise}}{\text{run}} = -\frac{5}{7}\). From \((0, -\frac{2}{3})\), move down 5 units and right 7 units. Plot the point. Draw a line through the two points.
4-1 Graphing Equations in Slope-Intercept Form

Graph each equation.
5. \(-4x + y = 2\)

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

\[-4x + y = 2\]  \hspace{1cm} \text{Original equation}
\[-4x + 4x + y = 2 + 4x\]  \hspace{1cm} \text{Add } 4x \text{ to each side.}
\[y = 4x + 2\]  \hspace{1cm} \text{Simplify.}

The slope is 4, and the \(y\)-intercept is 2. Plot the \(y\)-intercept (0, 2). The slope is \(\frac{\text{rise}}{\text{run}} = \frac{4}{1}\). From (0, 2), move up 4 units and right 1 unit. Plot the point. Draw a line through the two points.
4-1 Graphing Equations in Slope-Intercept Form

6. \(2x + y = -6\)

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

\[
\begin{align*}
2x + y &= -6 \quad \text{Original equation} \\
2x - 2x + y &= -6 - 2x \quad \text{Subtract 2x from each side} \\
y &= -2x - 6 \quad \text{Simplify.}
\end{align*}
\]

The slope is \(-2\), and the y-intercept is \(-6\). Plot the y-intercept \((0, -6)\). The slope is \(\frac{\text{rise}}{\text{run}} = \frac{-2}{1}\). From \((0, -6)\), move down 2 units and right 1 unit. Plot the point. Draw a line through the two points.

![Graph of the equation 2x + y = -6](image)
7. $-3x + 7y = 21$

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

$$-3x + 7y = 21 \quad \text{Original equation}$$

$$-3x + 3x + 7y = 21 + 3x \quad \text{Add } 3x \text{ to each side.}$$

$$7y = 3x + 21 \quad \text{Simplify.}$$

$$\frac{7y}{7} = \frac{3x + 21}{7} \quad \text{Divide each side by 7.}$$

$$y = \frac{3}{7}x + 3 \quad \text{Simplify.}$$

The slope is $\frac{3}{7}$, and the $y$-intercept is 3. Plot the $y$-intercept $(0, 3)$. The slope is $\frac{\text{rise}}{\text{run}} = \frac{3}{7}$. From $(0, 3)$, move up 3 units and right 7 units. Plot the point. Draw a line through the two points.
8. \(6x - 4y = 16\)

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

\[
6x - 4y = 16 \quad \text{Original equation}
\]
\[
6x - 6x - 4y = 16 - 6x \quad \text{Subtract } 6x \text{ from each side.}
\]
\[
-4y = -6x + 16 \quad \text{Simplify.}
\]
\[
\frac{-4y}{-4} = \frac{-6x + 16}{-4} \quad \text{Divide each side by } -4.
\]
\[
y = \frac{3}{2}x - 4 \quad \text{Simplify.}
\]

The slope is \(\frac{3}{2}\), and the \(y\)-intercept is \(-4\). Plot the \(y\)-intercept \((0, -4)\). The slope is \(\frac{\text{rise}}{\text{run}} = \frac{3}{2}\). From \((0, -4)\), move up 3 units and right 2 units. Plot the point. Draw a line through the two points.

![Graph of 6x - 4y = 16](image)

9. \(y = -1\)

**SOLUTION:**
Plot the \(y\)-intercept \((0, -1)\). The slope is 0. Draw a line through the points with \(y\)-coordinate \(-1\).

![Graph of y = -1](image)
4-1 Graphing Equations in Slope-Intercept Form

10. 15y = 3

**SOLUTION:**

\[ 15y = 3 \quad \text{Original equation} \]

\[ \frac{15y}{15} = \frac{3}{15} \quad \text{Divide each side by 15.} \]

\[ y = \frac{1}{5} \quad \text{Simplify.} \]

Plot the y-intercept \((0, \frac{1}{5})\). The slope is 0. Draw a line through the points with y-coordinate \(\frac{1}{5}\). 

![Graph showing the line with y-intercept (0, 1/5) and slope 0]
11. **SOLUTION:**

Use the two points (−3, 0) and (0, 2). Find the slope of the line containing the given points.

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

The line crosses the y-axis at (0, 2), so the y-intercept is 2.

Write the equation in slope-intercept form.

\[y = mx + b\]

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

**SOLUTION:**

Use the two points \( (5, 0) \) and \( (0, 1) \).
Find the slope of the line containing the given points.

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

The line crosses the \( y \)-axis at \( (0, 1) \), so the \( y \)-intercept is 1.

Write the equation in slope-intercept form.

\[
y = mx + b
\]

\[
y = -\frac{1}{5}x + 1
\]
4-1 Graphing Equations in Slope-Intercept Form

SOLUTION:
Use the two points $(-2, 0)$ and $(-2, 2)$.
Find the slope of the line containing the given points.

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

This means that the slope is undefined. Because the slope is undefined, it is not possible write and equation in slope intercept form.
4-1 Graphing Equations in Slope-Intercept Form

SOLUTION:
Use the two points (2, −1) and (0, 3).
Find the slope of the line containing the given points.

\[ m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3 - (-1)}{0 - 2} = \frac{4}{-2} = -2 \]

The line crosses the y-axis at (0, 3), so the y-intercept is 3.

Write the equation in slope-intercept form.

\[ y = mx + b \]
\[ y = -2x + 3 \]
4-1 Graphing Equations in Slope-Intercept Form

15. **FINANCIAL LITERACY**  Rondell is buying a new stereo system for his car using a layaway plan.

a. Write an equation for the total amount \( S \) that he has paid after \( w \) weeks.

b. Graph the equation.

c. Find out how much Rondell will have paid after 8 weeks.

**SOLUTION:**

a. The rate of $10 per week represents the rate or slope. The amount he has already saved is a constant $75, no matter how much more he saves. So, the total amount saved for \( w \) weeks can be written as \( S = 10w + 75 \).

b. To graph the equation, plot the \( y \)-intercept \( (0, 75) \). Then move up 10 units and right 1 unit. Plot the point. Draw a line through the two points.

c. To find out how much Rondell has saved after 8 weeks, evaluate the equation from part a for \( w = 8 \).

\[
S = 10w + 75 \\
S = 10(8) + 75 \\
S = 80 + 75 \\
S = 155
\]

So, Rondell has saved $155 after 8 weeks.
16. **CCSS REASONING** Ana is driving from her home in Miami, Florida, to her grandmother’s house in New York City. On the first day, she will travel 240 miles to Orlando, Florida, to pick up her cousin. Then they will travel 350 miles each day.

a. Write an equation for the total number of miles $m$ that Ana has traveled after $d$ days.

b. Graph the equation.

c. How long will the drive take if the total length of the trip is 1343 miles?

**SOLUTION:**

a. The rate of 350 miles per day represents the rate or slope. The amount she has already driven is a constant 240 miles, no matter how much more she drives. So, the total amount driven for $d$ days can be written as $m = 350d + 240$.

b. To graph the equation, plot the $y$-intercept (0, 240). Then move up 350 units and right 1 unit. Plot the point. Draw a line through the two points.

c. 

\[
\begin{align*}
  m &= 350d + 240 & \text{Original equation} \\
  1343 &= 350d + 240 & \text{Replace } m \text{ with 1343.} \\
  1343 - 240 &= 350d + 240 - 240 & \text{Subtract 240 from each side} \\
  1103 &= 350d & \text{Simplify.} \\
  \frac{1103}{350} &= \frac{350d}{350} & \text{Divide each side by 350.} \\
  3.15 &\approx d & \text{Simplify.}
\end{align*}
\]

So, it will take about 4 days.
Write an equation of a line in slope-intercept form with the given slope and y-intercept. Then graph the equation.

17. slope: 5, y-intercept: 8

SOLUTION:
The slope-intercept form of a line is \( y = mx + b \), where \( m \) is the slope, and \( b \) is the y-intercept.

\[
y = mx + b \quad \text{Slope-intercept form} \\
y = 5x + 8 \quad \text{Replace with 5 and } b \text{ with } 8.
\]

Plot the y-intercept (0, 8). The slope is \( \frac{\text{rise}}{\text{run}} = \frac{5}{1} \). From (0, 8), move down 5 units and left 1 unit. (Note that we can move up and to the right, or down and to the left. Normally we would move up and to the right, but moving down and to the left keeps the point near the origin.)

Plot the point. Draw a line through the two points.
4-1 Graphing Equations in Slope-Intercept Form

18. slope: 3, \( y \)-intercept: 10

**SOLUTION:**
The slope-intercept form of a line is \( y = mx + b \), where \( m \) is the slope, and \( b \) is the \( y \)-intercept.

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

\[
y = 3x + 10 \quad \text{Replace } m \text{ with } 3 \text{ and } b \text{ with } 10.
\]

Plot the \( y \)-intercept (0, 10). The slope is \( \frac{\text{rise}}{\text{run}} = \frac{3}{1} \). From (0, 10), move up 3 units and right 1 unit. Plot the point. Draw a line through the two points.

![Graph of y = 3x + 10](image)

19. slope: -4, \( y \)-intercept: 6

**SOLUTION:**
The slope-intercept form of a line is \( y = mx + b \), where \( m \) is the slope, and \( b \) is the \( y \)-intercept.

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

\[
y = -4x + 6 \quad \text{Replace } m \text{ with } -4 \text{ and } b \text{ with } 6.
\]

Plot the \( y \)-intercept (0, 6). The slope is \( \frac{\text{rise}}{\text{run}} = \frac{-4}{1} \). From (0, 6), move down 4 units and right 1 unit. Plot the point. Draw a line through the two points.

![Graph of y = -4x + 6](image)
4-1 Graphing Equations in Slope-Intercept Form

20. slope: \(-2\), \(y\)-intercept: 8

**SOLUTION:**
The slope-intercept form of a line is \(y = mx + b\), where \(m\) is the slope, and \(b\) is the \(y\)-intercept.

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

\[
y = -2x + 8 \quad \text{Replace} \ m \text{with } -2 \text{ and } b \text{ with } 8
\]

Plot the \(y\)-intercept \((0, 8)\). The slope is \(\frac{\text{rise}}{\text{run}} = \frac{-2}{1}\). From \((0, 8)\), move down 2 units and right 1 unit. Plot the point. Draw a line through the two points.

![Graph of \(y = -2x + 8\)](image)

21. slope: 3, \(y\)-intercept: \(-4\)

**SOLUTION:**
The slope-intercept form of a line is \(y = mx + b\), where \(m\) is the slope, and \(b\) is the \(y\)-intercept.

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

\[
y = 3x - 4 \quad \text{Replace} \ m \text{with } 3 \text{ and } b \text{ with } -4
\]

Plot the \(y\)-intercept \((0, -4)\). The slope is \(\frac{\text{rise}}{\text{run}} = \frac{3}{1}\). From \((0, -4)\), move up 3 units and right 1 unit. Plot the point. Draw a line through the two points.

![Graph of \(y = 3x - 4\)](image)
4-1 Graphing Equations in Slope-Intercept Form

22. slope: 4, y-intercept: −6

**SOLUTION:**
The slope-intercept form of a line is \( y = mx + b \), where \( m \) is the slope, and \( b \) is the y-intercept.

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

\[
y = 4x - 6 \quad \text{Replace } m \text{ with } 4 \text{ and } b \text{ with } -6
\]

Plot the y-intercept \((0, -6)\). The slope is \( \frac{\text{rise}}{\text{run}} = \frac{4}{1} \). From \((0, -6)\), move up 4 units and right 1 unit. Plot the point. Draw a line through the two points.
4-1 Graphing Equations in Slope-Intercept Form

Graph each equation.
23. \(-3x + y = 6\)

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

\[-3x + y = 6 \quad \text{Original equation}\]
\[-3x + 3x + y = 6 + 3x \quad \text{Add } x \text{ to each side}\]
\[y = 3x + 6 \quad \text{Simplify}\]

The slope is 3, and the \(y\)-intercept is 6. Plot the \(y\)-intercept \((0, 6)\). The slope is \(\frac{\text{rise}}{\text{run}} = \frac{3}{1}\). From \((0, 6)\), move up 3 units and right 1 unit. Plot the point. Draw a line through the two points.
24. \(-5x + y = 1\)

\textbf{SOLUTION:}

Rewrite the equation in slope-intercept form.

\[-5x + y = 1\]
\[-5x + 5x + y = 1 + 5x\] Add 5x to each side.
\[y = 5x + 1\] Simplify.

The slope is 5, and the \(y\)-intercept is 1. Plot the \(y\)-intercept (0, 1). The slope is \(\frac{\text{rise}}{\text{run}} = \frac{5}{1}\). From (0, 1), move up 5 units and right 1 unit. Plot the point. Draw a line through the two points.
4-1 Graphing Equations in Slope-Intercept Form

25. \(-2x + y = -4\)

**SOLUTION:**

Rewrite the equation in slope-intercept form.

\[
\begin{align*}
-2x + y &= -4 \quad \text{Original equation} \\
-2x + 2x + y &= -4 + 2x \quad \text{Add } 2x \text{ to each side} \\
y &= 2x - 4 \quad \text{Simplify.}
\end{align*}
\]

The slope is 2, and the \(y\)-intercept is \(-4\). Plot the \(y\)-intercept \((0, -4)\). The slope is \(\frac{\text{rise}}{\text{run}} = \frac{2}{1}\). From \((0, -4)\), move up 2 units and right 1 unit. Plot the point. Draw a line through the two points.

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

26. \(y = 7x - 7\)

**SOLUTION:**

The slope is 7, and the \(y\)-intercept is \(-7\). Plot the \(y\)-intercept \((0, -7)\). The slope is \(\frac{\text{rise}}{\text{run}} = \frac{7}{1}\). From \((0, -7)\), move up 7 units and right 1 unit. Plot the point. Draw a line through the two points.

![Graph of \(y = 7x - 7\)]
4-1 Graphing Equations in Slope-Intercept Form

27. \( 5x + 2y = 8 \)

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

\[
\begin{align*}
5x + 2y &= 8 \quad \text{Original equation} \\
5x - 5x + 2y &= 8 - 5x \quad \text{Subtract 5x from each side} \\
2y &= -5x + 8 \quad \text{Simplify.} \\
\frac{2y}{2} &= \frac{-5x + 8}{2} \quad \text{Divide each side by 2.} \\
y &= -\frac{5}{2}x + 4 \quad \text{Simplify.}
\end{align*}
\]

The slope is \(-\frac{5}{2}\), and the \(y\)-intercept is 4. Plot the \(y\)-intercept \((0, 4)\). The slope is \(\frac{\text{rise}}{\text{run}} = -\frac{5}{2}\). From \((0, 4)\), move down 5 units and right 2 units. Plot the point. Draw a line through the two points.
4-1 Graphing Equations in Slope-Intercept Form

28. \(4x + 9y = 27\)

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

\[
\begin{align*}
4x + 9y &= 27 & \text{Original equation} \\
4x - 4x + 9y &= 27 - 4x & \text{Subtract 4x from each side.} \\
9y &= -4x + 27 & \text{Simplify.} \\
\frac{9y}{9} &= \frac{-4x+27}{9} & \text{Divide each side by 9.} \\
y &= -\frac{4}{9}x + 3 & \text{Simplify.}
\end{align*}
\]

The slope is \(-\frac{4}{9}\), and the y-intercept is 3. Plot the y-intercept (0, 3). The slope is \(\frac{\text{rise}}{\text{run}} = \frac{-4}{9}\). From (0, 3), move down 4 units and right 9 units. Plot the point. Draw a line through the two points.

29. \(y = 7\)

**SOLUTION:**
Plot the y-intercept (0, 7). The slope is 0. Draw a line through the points with y-coordinate 7.
30. \( y = -\frac{2}{3} \)

**SOLUTION:**
Plot the y-intercept \((0, -\frac{2}{3})\). The slope is 0. Draw a line through the points with y-coordinate \(-\frac{2}{3}\).

31. \( 21 = 7y \)

**SOLUTION:**
\[
21 = 7y \\
\frac{21}{7} = \frac{7y}{7} \\
3 = y
\]
Plot the y-intercept \((0, 3)\). The slope is 0. Draw a line through the points with y-coordinate 3.
4-1 Graphing Equations in Slope-Intercept Form

32. $3y - 6 = 2x$

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

\[
\begin{align*}
3y - 6 &= 2x \quad \text{Original equation} \\
3y - 6 + 6 &= 2x + 6 \quad \text{Add 6 to each side.} \\
3y &= 2x + 6 \quad \text{Simplify.} \\
\frac{3y}{3} &= \frac{2x + 6}{3} \quad \text{Divide each side by 3.} \\
y &= \frac{2}{3}x + 2 \quad \text{Simplify.}
\end{align*}
\]

The slope is $\frac{2}{3}$, and the $y$-intercept is 2. Plot the $y$-intercept $(0, 2)$. The slope is $\frac{\text{rise}}{\text{run}} = \frac{2}{3}$. From $(0, 2)$, move up 2 units and right 3 units. Plot the point. Draw a line through the two points.

![Graph of the equation $3y - 6 = 2x$.](image)

![Graph of the equation $3y - 6 = 2x$.](image)
Write an equation in slope-intercept form for each graph shown.

33. 

**SOLUTION:**

Use the two points (0, 4) and (5, 1).

Find the slope of the line containing the given points.

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

\[
= \frac{4 - (1)}{0 - 5}
\]

\[
= \frac{3}{-5}
\]

The line crosses the y-axis at (0, 4), so the y-intercept is 4.

Write the equation in slope-intercept form.

\[
y = mx + b
\]

\[
y = \frac{3}{5}x + 4
\]
SOLUTION:
Use the two points (0, –2) and (7, –6).
Find the slope of the line containing the given points.

\[ m = \frac{y_2 - y_1}{x_2 - x_1} \]
\[ = \frac{-2 - (-6)}{0 - 7} \]
\[ = \frac{4}{-7} \]
\[ = -\frac{4}{7} \]

The line crosses the y-axis at (0, –2), so the y-intercept is –2.

Write the equation in slope-intercept form.

\[ y = mx + b \]
\[ y = -\frac{4}{7} x - 2 \]
4-1 Graphing Equations in Slope-Intercept Form

35. 

**SOLUTION:**

Use the two points (0, -3) and (6, 0) to find the slope of the line containing the given points.

\[
m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-3 - 0}{6 - 0} = \frac{-3}{6} = -\frac{1}{2}
\]

The line crosses the y-axis at (0, -3), so the y-intercept is -3.

Write the equation in slope-intercept form.

\[
y = mx + b
\]

\[
y = -\frac{1}{2}x - 3
\]
36. SOLUTION: Use the two points \((0, -4)\) and \((8, -2)\).
Find the slope of the line containing the given points.

\[
m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-4 - (-2)}{0 - 8} = \frac{-2}{-8} = \frac{1}{4}
\]

The line crosses the \(y\)-axis at \((0, -4)\), so the \(y\)-intercept is \(-4\).
Write the equation in slope-intercept form.

\[
y = mx + b
y = \frac{1}{4}x - 4
\]
4-1 Graphing Equations in Slope-Intercept Form

37. MANATEES In 1991, 1267 manatees inhabited Florida’s waters. The manatee population has increased at a rate of 123 manatees per year.

a. Write an equation for the manatee population, \( P \), \( t \) years since 1991.

b. Graph this equation.

c. In 2006, the manatee was removed from Florida’s endangered species list. What was the manatee population in 2006?

**SOLUTION:**

a. The rate of 123 manatees per year represents the rate or slope. The original population of manatees is a constant 1267, no matter how many more manatees are born. So, the total population of manatees for \( t \) years since 1991 can be written as \( P = 1267 + 123t \).

b. To graph the equation, plot the \( y \)-intercept (0, 1267). Then move up 123 units and right 1 unit. Plot the point. Draw a line through the two points.

c. Fifteen years passed between 1991 and 2006, so substitute 15 for \( t \) and solve for \( P \).

\[
\begin{align*}
P &= 1267 + 123t \\
P &= 1267 + 123(15) \\
P &= 1267 + 1845 \\
P &= 3112
\end{align*}
\]

So, the manatee population in 2006 was 3112.
4-1 Graphing Equations in Slope-Intercept Form

Write an equation of a line in slope-intercept form with the given slope and y-intercept.

38. slope: \( \frac{1}{2} \), y-intercept: \(-3\)

**SOLUTION:**
The slope-intercept form of a line is \( y = mx + b \), where \( m \) is the slope, and \( b \) is the y-intercept.

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

39. slope: \( \frac{2}{3} \), y-intercept: \(-5\)

**SOLUTION:**
The slope-intercept form of a line is \( y = mx + b \), where \( m \) is the slope, and \( b \) is the y-intercept.

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

40. slope: \( -\frac{5}{6} \), y-intercept: 5

**SOLUTION:**
The slope-intercept form of a line is \( y = mx + b \), where \( m \) is the slope, and \( b \) is the y-intercept.

\[
y = mx + b \\
y = -\frac{5}{6}x + 5
\]

41. slope: \( -\frac{3}{7} \), y-intercept: 2

**SOLUTION:**
The slope-intercept form of a line is \( y = mx + b \), where \( m \) is the slope, and \( b \) is the y-intercept.

\[
y = mx + b \\
y = -\frac{3}{7}x + 2
\]
4-1 Graphing Equations in Slope-Intercept Form

42. slope: 1, y-intercept: 4

SOLUTION:
The slope-intercept form of a line is \( y = mx + b \), where \( m \) is the slope, and \( b \) is the y-intercept.

\[
y = mx + b \\
y = x + 4
\]

43. slope: 0, y-intercept: 5

SOLUTION:
The slope-intercept form of a line is \( y = mx + b \), where \( m \) is the slope, and \( b \) is the y-intercept.

\[
y = mx + b \\
y = 0x + 5 \\
y = 5
\]

Graph each equation.

44. \( y = \frac{3}{4}x - 2 \)

SOLUTION:
The slope is \( \frac{3}{4} \), and the y-intercept is \(-2\). Plot the y-intercept \((0, -2)\). The slope is \( \frac{\text{rise}}{\text{run}} = \frac{3}{4} \). From \((0, -2)\), move up 3 units and right 4 units. Plot the point. Draw a line through the two points.

![Graph of y = \( \frac{3}{4}x \) - 2]

\( \text{y-intercept: } 0, \text{ y-intercept: } 4 \)
4-1 Graphing Equations in Slope-Intercept Form

45. \( y = \frac{5}{3}x + 4 \)

SOLUTION:
The slope is \( \frac{5}{3} \), and the y-intercept is 4. Plot the y-intercept (0, 4). The slope is \( \frac{\text{rise}}{\text{run}} = \frac{5}{3} \). From (0, 4), move down 5 units and left 3 units. (Note that we can move up and to the right, or down and to the left. Normally we would move up and to the right, but moving down and to the left keeps the point near the origin.). Plot the point. Draw a line through the two points.
4-1 Graphing Equations in Slope-Intercept Form

46. $3x + 8y = 32$

**SOLUTION:**

Rewrite the equation in slope-intercept form.

\[
\begin{align*}
3x + 8y &= 32 & \text{Original equation} \\
3x - 3x + 8y &= 32 - 3x & \text{Subtract 3x from each side} \\
8y &= -3x + 32 & \text{Simplify.} \\
\frac{8y}{8} &= \frac{-3x + 32}{8} & \text{Divide each side by 8.} \\
y &= -\frac{3}{8}x + 4 & \text{Simplify.}
\end{align*}
\]

The slope is $-\frac{3}{8}$, and the $y$-intercept is 4. Plot the $y$-intercept $(0, 4)$. The slope is $\frac{\text{rise}}{\text{run}} = -\frac{3}{8}$. From $(0, 4)$, move down 3 units and right 8 units. Plot the point. Draw a line through the two points.
4-1 Graphing Equations in Slope-Intercept Form

47. \(5x - 6y = 36\)

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

\[
5x - 6y = 36 \quad \text{Original equation} \\
5x - 5x - 6y = 36 - 5x \quad \text{Subtract 5x from each side} \\
-6y = -5x + 36 \quad \text{Simplify} \\
\frac{-6y}{-6} = \frac{-5x + 36}{-6} \quad \text{Divide each side by -6.} \\
y = \frac{5}{6}x - 6 \quad \text{Simplify.}
\]

The slope is \(\frac{5}{6}\), and the y-intercept is \(-6\). Plot the y-intercept \((0, -6)\). The slope is \(\frac{\text{rise}}{\text{run}} = \frac{5}{6}\). From \((0, -6)\), move up 5 units and right 6 units. Plot the point. Draw a line through the two points.

![Graph of the equation](image-url)
4-1 Graphing Equations in Slope-Intercept Form

48. \(-4x + \frac{1}{2}y = -1\)

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

\[
\begin{align*}
-4x + \frac{1}{2}y &= -1 \quad \text{Original equation} \\
-4x + 4x + \frac{1}{2}y &= -1 + 4x \quad \text{Add} 4x \text{to each side.} \\
\frac{1}{2}y &= 4x - 1 \quad \text{Simplify.} \\
2\left(\frac{1}{2}y\right) &= 2(4x - 1) \quad \text{Multiply each side by 2.} \\
y &= 8x - 2 \quad \text{Simplify.}
\end{align*}
\]

The slope is 8, and the \(y\)-intercept is -2. Plot the \(y\)-intercept (0, -2). The slope is \(\frac{\text{rise}}{\text{run}} = \frac{8}{1}\). From (0, -2), move up 8 units and right 1 unit. Plot the point. Draw a line through the two points.
49. \(3x - \frac{1}{4}y = 2\)

**SOLUTION:**

Rewrite the equation in slope-intercept form.

\[
\begin{align*}
3x - \frac{1}{4}y &= 2 & \text{Original equation} \\
3x - 3x - \frac{1}{4}y &= 2 - 3x & \text{Subtract } 3x \text{ from each side.} \\
-\frac{1}{4}y &= -3x + 2 & \text{Simplify.} \\
-4\left(-\frac{1}{4}y\right) &= -4(-3x + 2) & \text{Multiply each side by } -4. \\
y &= 12x - 8 & \text{Simplify.}
\end{align*}
\]

The slope is 12, and the y-intercept is -8. Plot the y-intercept (0, -8). The slope is \(\frac{\text{rise}}{\text{run}} = \frac{12}{1}\). From (0, -8), move up 12 units and right 1 unit. Plot the point. Draw a line through the two points.
4-1 Graphing Equations in Slope-Intercept Form

50. TRAVEL A rental company charges $8 per hour for a mountain bike plus a $5 fee for a helmet.

a. Write an equation in slope-intercept form for the total rental cost $C$ for a helmet and a bicycle for $t$ hours.

b. Graph the equation.

c. What would the cost be for two helmets and 2 bicycles for 8 hours?

SOLUTION:

a. The rate of $8 per hour represents the rate or slope. The amount of $5 for a helmet is constant, no matter how many hours you use the bike. So, the total rental fee for $t$ hours can be written as $C = 8t + 5$.

b. To graph the equation, plot the y-intercept (0, 5). Then move up 8 units and right 1 unit. Plot the point. Draw a line through the two points.

c.

\[ C = 8t + 5 \]
\[ C = 8(8) + 5 \]
\[ C = 64 + 5 \]
\[ C = 69 \]

The cost for one bike and one helmet for 8 hours is $69. So, the cost for two bikes and two helmets for 8 hours is $138.
4-1 Graphing Equations in Slope-Intercept Form

51. CCSS REASONING For Illinois residents, the average tuition at Chicago State University is $157 per credit hour. Fees cost $218 per year.

   a. Write an equation in slope-intercept form for the tuition $T$ for $c$ credit hours.

   SOLUTION:
   a. The independent variable in this case is $c$, the number of credit hours, and the dependent variable is the tuition costs $T$. Tuition costs increase by $157 for each credit hour, and there is a flat fee of $218, so the slope is $157 and the $T$-intercept is $218.

   $T = 157c + 218$

   b. For a student taking 32 credit hours, the cost of tuition is $T = 157(32) + 218 = $5242

   Write an equation of a line in slope-intercept form with the given slope and $y$-intercept.

52. slope: $-1$, $y$-intercept: 0

   SOLUTION:
   The slope-intercept form of a line is $y = mx + b$, where $m$ is the slope, and $b$ is the $y$-intercept.

   $y = mx + b$
   $y = -1x + 0$
   $y = -x$

53. slope: 0.5, $y$-intercept: 7.5

   SOLUTION:
   The slope-intercept form of a line is $y = mx + b$, where $m$ is the slope, and $b$ is the $y$-intercept.

   $y = mx + b$
   $y = 0.5x + 7.5$

54. slope: 0, $y$-intercept: 7

   SOLUTION:
   The slope-intercept form of a line is $y = mx + b$, where $m$ is the slope, and $b$ is the $y$-intercept.

   $y = mx + b$
   $y = 0x + 7$
   $y = 7$
4-1 Graphing Equations in Slope-Intercept Form

55. slope: $-1.5$, y-intercept: $-0.25$

**SOLUTION:**

The slope-intercept form of a line is $y = mx + b$, where $m$ is the slope, and $b$ is the y-intercept.

\[
y = mx + b
\]
\[
y = -1.5x + (-0.25)
\]
\[
y = -1.5x - 0.25
\]

56. Write an equation of a horizontal line that crosses the y-axis at (0, -5).

**SOLUTION:**

A horizontal line has the same y-values. So, the slope is 0. The y-intercept is at -5, so the equation would be $y = 0x - 5$ or $y = -5$.

57. Write an equation of a line that passes through the origin and has a slope of 3.

**SOLUTION:**

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

So, the equation of the line would be $y = 3x$. 
4-1 Graphing Equations in Slope-Intercept Form

58. **TEMPERATURE**  The temperature dropped rapidly overnight. Starting at 80°F, the temperature dropped 3° per minute.

   a. Draw a graph that represents this drop from 0 to 8 minutes.

   b. Write an equation that describes this situation. Describe the meaning of each variable as well as the slope and y-intercept.

   **SOLUTION:**
   a. To graph the equation, plot the y-intercept (0, 80). Then move down 3 units and right 1 unit. Plot the point. Draw a line through the two points.

   ![Graph showing temperature drop over time]

   b. The rate of 3° per minute represents the rate or slope. The amount of 80° starting temperature is constant, no matter how many minutes the temperature drops. So, the total temperature drop for \( x \) minutes can be written as \( y = -3x + 80 \). \( y \) represents the temperature and \( x \) represents the elapsed time in minutes. The slope represents the change in temperature per minute and the y-intercept represents the temperature when it started to drop.
59. **FITNESS** Refer to the information given.

**SOLUTION:**

**a.** Write an equation that represents the cost \( C \) of a membership for \( m \) months.

\[ C = 45m + 145 \]

**b.** What does the slope represent?

The slope represents the cost per month to maintain the membership.

**c.** What does the \( C \)-intercept represent?

The \( C \)-intercept represents the start-up fee.

**d.** What is the cost of a two-year membership?

There are 24 months in 2 years, solve substitute 24 for \( m \) and solve for \( C \).

\[ C = 45(24) + 145 \]
\[ C = 1080 + 145 \]
\[ C = 1225 \]

The cost for a two-year membership is $1225.
4-1 Graphing Equations in Slope-Intercept Form

60. MAGAZINES  A teen magazine began with a circulation of 500,000 in its first year. Since then, the circulation has increased an average of 33,388 per year.

   a. Write an equation that represents the circulation $c$ after $t$ years.

   b. What does the slope represent?

   c. What does the $c$-intercept represent?

   d. If the magazine began in 1944, and this trend continues, in what year will the circulation reach 3,000,000?

SOLUTION:

   a. The rate of 33,388 magazines per year represents the rate or slope. The amount of 500,000 magazines in the first year of circulation is constant, no matter how many magazines are sold. So, the total circulation for $t$ years can be written as $c = 33,388t + 500,000$.

   b. The slope represents the increase in circulation each year.

   c. The $c$-intercept represents the circulation in the first year.

   d. 

      \[
      c = 33,388t + 500,000 \\
      3,000,000 = 33,388t + 500,000 \\
      3,000,000 - 500,000 = 33,388t + 500,000 - 500,000 \\
      2,500,000 = 33,388t \\
      \frac{2,500,000}{33,388} = \frac{33,388t}{33,388} \\
      74.88 = t
      \]

   That means it will take 75 years to reach 3,000,000 magazines circulated. So, this will happen in $1944 + 75 = 2019$. 

4-1 Graphing Equations in Slope-Intercept Form

61. **SMART PHONES** A telecommunications company sold 3305 smart phones in the first year of production. Suppose, on average, they expect to sell 25 phones per day.

   a. Write an equation for the number of smart phones $P$ sold $t$ years after the first year of production, assuming 365 days per year.

   $$P = 9125t + 3305$$  
   Original equation

   $$100,000 = 9125t + 3305$$  
   Replace $P$ with 100,000.

   $$100,000 - 3305 = 9125t + 3305 - 3305$$  
   Subtract 3305 from each side.

   $$96,695 = 9125t$$  
   Simplify.

   $$\frac{96,695}{9125} = \frac{9125t}{9125}$$  
   Divide each side by 9125.

   $$10.6 \approx t$$  
   Simplify.

   12 yr

   b. If sales continue at this rate, how many years will it take for the company to sell 100,000 phones?

   **SOLUTION:**

   a. The end of the first year, $t = 0$, and $P = 3305$. This is the $y$-intercept. The slope is the number on phone sales per year or $25. m = 25 \cdot 365 = 9125$. Thus, the equation to represent this scenario is $P = 9125t + 3305$.

   b. To find the number of years to reach 100,000, substitute 100,000 for $P$ and solve for $t$.

62. **OPEN ENDED** Draw a graph representing a real-world linear function and write an equation for the graph. Describe what the graph represents.

   **SOLUTION:**

   Students’ answers will vary.

   Sample answer: $y = x + 15$; The initial cost of joining a movie club is $15. Then each movie costs $1 for a 1-night rental.
4-1 Graphing Equations in Slope-Intercept Form

63. REASONING Determine whether the equation of a vertical line can be written in slope-intercept form. Explain your reasoning.

SOLUTION:
A vertical line can not be written in slope-intercept form. Consider the following example.

Choose points (−2, −3) and (−2, 4). Find the slope.

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

\[ = \frac{4 - (-3)}{-2 - (-2)} \]
Let (−2, −3) = (x_1, y_1) and (−2, 4) = (x_2, y_2)

\[ = \frac{7}{0} \]  
Simplify.

The slope is not defined for a vertical. Since the line has no slope, it cannot be written in slope-intercept form.

64. CHALLENGE Summarize the characteristics that the graphs \( y = 2x + 3, y = 4x + 3, y = -x + 3, \) and \( y = -10x + 3 \) have in common.

SOLUTION:
All for graph have the same y-intercept. Therefore they all cross the y-axis at 3.
4-1 Graphing Equations in Slope-Intercept Form

65. CCSS REGULARITY  If given an equation in standard form, explain how to determine the rate of change.

SOLUTION:
Assume that the coefficient of $y$ is not 0. We would first have to rewrite the equation in slope-intercept form. The rate of change is also the slope, so the coefficient for the $x$-variable is the rate of change.

For example, consider the equation $2x + 4y = 12$.
Solve for $y$.

\[
\begin{align*}
2x + 4y &= 12 & \text{Original equation} \\
2x - 2x + 4y &= -2x + 12 & \text{Subtract 2x from each side.} \\
4y &= 2x + 12 & \text{Simplify.} \\
\frac{4y}{4} &= \frac{2x+12}{4} & \text{Divide each side by 4.} \\
y &= \frac{1}{2}x + 3 & \text{Simplify.}
\end{align*}
\]

The slope is $\frac{1}{2}$.

66. WRITING IN MATH  Explain how you would use a given $y$-intercept and the slope to predict a $y$-value for a given $x$-value without graphing.

SOLUTION:
If the slope is $m$ and the $y$-intercept is $b$, substitute the given $x$-values for $x$ in $y = mx + b$. Then simplify.

For example, if $m = 12$ and $b = 4$, write the equation in slope-intercept form.
\[
y = 12x + 4.
\]
If you are given $x = 14$ and asked to find $y$. Substitute the $x$-value into $y = 12x + 4$.
\[
y = 12(13) + 4 = 160
\]

67. A music store has $x$ CDs in stock. If 350 are sold and $3y$ are added to stock, which expression represents the number of CDs in stock?

A  $350 + 3y - x$

B  $x - 350 + 3y$

C  $x + 350 + 3y$

D  $3y - 350 - x$

SOLUTION:
If $x$ is the number of CDs the store has, the number sold will be represented by $-350$, so choices A and C can be eliminated because they do not have a negative 350. The number of CDs stocked can be represented by $+3y$. So the expression is $x - 350 + 3y$.

The correct choice is B.
68. **PROBABILITY** The table shows the result of a survey of favorite activities. What is the probability that a student’s favorite activity is sports or drama club?

<table>
<thead>
<tr>
<th>Extracurricular Activity</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>art club</td>
<td>24</td>
</tr>
<tr>
<td>band</td>
<td>134</td>
</tr>
<tr>
<td>choir</td>
<td>37</td>
</tr>
<tr>
<td>drama club</td>
<td>46</td>
</tr>
<tr>
<td>mock trial</td>
<td>19</td>
</tr>
<tr>
<td>school paper</td>
<td>26</td>
</tr>
<tr>
<td>sports</td>
<td>314</td>
</tr>
</tbody>
</table>

\[
F \frac{3}{8} \\
G \frac{4}{9} \\
H \frac{3}{5} \\
J \frac{2}{3}
\]

**SOLUTION:**

To find the probability, you need to first find the number of favorable results, which is sports or drama club. This total is \(314 + 46 = 360\). Next, find the total number of outcomes \(24 + 134 + 37 + 46 + 19 + 26 + 314 = 600\). So, the probability is favorable outcomes over the total outcomes. \(\frac{360}{600} = \frac{3}{5}\). So, the correct choice is H.
4-1 Graphing Equations in Slope-Intercept Form

69. A recipe for fruit punch calls for 2 ounces of orange juice for every 8 ounces of lemonade. If Jennifer uses 64 ounces of lemonade, which proportion can she use to find \( x \), the number of ounces of orange juice needed?

A \[ \frac{2}{x} = \frac{64}{6} \]

B \[ \frac{8}{x} = \frac{64}{2} \]

C \[ \frac{2}{\frac{x}{8}} = \frac{64}{64} \]

D \[ \frac{6}{\frac{x}{2}} = \frac{64}{64} \]

**SOLUTION:**

The fraction of orange juice to lemonade for one recipe can be represented by \( \frac{2}{8} \). The number of ounces of orange juice needed if 64 ounces of lemonade are used can be found by the equation \( \frac{2}{8} = \frac{x}{64} \).

So, the correct choice is C.
4-1 Graphing Equations in Slope-Intercept Form

70. EXTENDED RESPONSE  The table shows the results of a canned food drive. 1225 cans were collected, and the 12th grade class collected 55 more cans than the 10th grade class. How many cans each did the 10th and 12th grade classes collect? Show your work.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Cans</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>340</td>
</tr>
<tr>
<td>10</td>
<td>x</td>
</tr>
<tr>
<td>11</td>
<td>280</td>
</tr>
<tr>
<td>12</td>
<td>y</td>
</tr>
</tbody>
</table>

SOLUTION:

The 10th grade class collected 275, and the 12th grade class collected 330. First I found that the total number of cans collected by the 10th and 12th grade classes is 1225 – (340 + 280) or 605. Then, if x is the number of cans the 10th grade class collected, then the 12th grade class collected x + 55 cans. The sum of these is 605.

\[
10\text{th} = x, 12\text{th} = x + 55
\]

\[
x + x + 55 = 605
\]

\[
2x + 55 = 605
\]

\[
2x + 55 - 55 = 605 - 55
\]

\[
2x = 550
\]

\[
x = 275
\]

10\text{th} = 275; 12\text{th} = 275 + 55 = 330
For each arithmetic sequence, determine the related function. Then determine if the function is proportional or nonproportional.

71. 3, 7, 11, …

**SOLUTION:**

\[ 7 - 3 = 4 \]
\[ 11 - 7 = 4 \]

The common difference is 4. Substitute the first term and the difference into the formula for the \( n \)th term is

\[ a_n = a_1 + (n - 1)d . \]

\[ a_n = 3 + (n - 1)(4) \]
\[ a_n = 3 + 4n - 4 \]
\[ a_n = 4n - 1 \]

Graph the equation.

Since (0, 0) is not on the graph, it is nonproportional.
4-1 Graphing Equations in Slope-Intercept Form

72. 8, 6, 4, …

**SOLUTION:**

\[ 6 - 8 = -2 \]
\[ 4 - 6 = -2 \]

The common difference is \(-2\). Substitute the first term and the difference into the formula for the \(n\)th term is \(a_n = a_1 + (n - 1)d\).

\[ a_n = 8 + (n - 1)(-2) \]
\[ a_n = 8 - 2n + 2 \]
\[ a_n = -2n + 10 \]

Graph the equation.

Since \((0, 0)\) is not on the graph, it is nonproportional.
4-1 Graphing Equations in Slope-Intercept Form

73. 0, 3, 6, …

**SOLUTION:**

3 – 0 = 3
6 – 3 = 3

The common difference is 3. Substitute the first term and the difference into the formula for the $n$th term is $a_n = a_1 + (n - 1)d$.

$$a_n = 0 + (n - 1)(3)$$

$$a_n = 3n - 3$$

Graph the equation.

Since (0, 0) is not on the graph, it is nonproportional.

74. 1, 2, 3, …

**SOLUTION:**

The common difference is 1. Substitute the first term and the difference into the formula for the $n$th term is $a_n = a_1 + (n - 1)d$.

$$a_n = 1 + (n - 1)(1)$$

$$a_n = 1 + n - 1$$

$$a_n = n$$

Graph the equation.

Since (0, 0) is not on the graph, it is nonproportional.
4-1 Graphing Equations in Slope-Intercept Form

75. GAME SHOWS  Contestants on a game show win money by answering 10 questions.

![10 Questions Table]

a. If the value of the first question is $3000, find the value of the 10th question.

b. If all questions are answered correctly, how much are the winnings?

**SOLUTION:**

a. Let \( q \) represent the number of questions.

The contestant wins $3000 for first questions and $2500 for the remaining ones. Since \( q \) represents the number of questions, the remaining number of questions is \( q - 1 \). Then the total winning can be represented as \( 3000 + 2500(q - 1) \).

\[
3000 + 2500(q - 1) = 3000 + 2500(10 - 1) \\
= 3000 + 2500(9) \\
= 3000 + 22,500 \\
= 25,500
\]

So, the 10th question is worth $25,500.

b. If the contestant answers all 10 questions correctly, he or she will win:

\[
3000 + 5500 + 8000 + 10,500 + \\
13,000 + 15,500 + 18,000 + \\
20,500 + 23,000 + 25,500 \\
= 142,500
\]

So, the contestant will win $142,500.
4-1 Graphing Equations in Slope-Intercept Form

Suppose $y$ varies directly as $x$. Write a direct variation equation that relates $x$ and $y$. Then solve.

76. If $y = 10$ when $x = 5$, find $y$ when $x = 6$.

**SOLUTION:**

\[
y = kx
\]

\[
10 = k(5)
\]

\[
\frac{10}{5} = \frac{k(5)}{5}
\]

\[
2 = k
\]

So, the direct variation equation is $y = 2x$. Substitute 6 for $x$ and find $y$.

\[
y = 2x
\]

\[
y = 2(6)
\]

\[
y = 12
\]

So, $y = 12$ when $x = 6$.

77. If $y = -16$ when $x = 4$, find $x$ when $y = 20$.

**SOLUTION:**

\[
y = kx
\]

\[
-16 = k(4)
\]

\[
\frac{-16}{4} = \frac{k(4)}{4}
\]

\[
-4 = k
\]

So, the direct variation equation is $y = -4x$. Substitute 20 for $y$ and find $x$.

\[
y = -4x
\]

\[
20 = -4x
\]

\[
\frac{20}{-4} = \frac{-4x}{-4}
\]

\[
-5 = x
\]

So, $x = -5$ when $y = 20$. 
4-1 Graphing Equations in Slope-Intercept Form

78. If \( y = 6 \) when \( x = 18 \), find \( y \) when \( x = -12 \).

**SOLUTION:**

\[
y = kx
\]

\[
6 = k(18)
\]

\[
\frac{6}{18} = k(18)
\]

\[
\frac{1}{3} = k
\]

So, the direct variation equation is \( y = \frac{1}{3}x \). Substitute \(-12\) for \( x \) and find \( y \).

\[
y = \frac{1}{3}(-12)
\]

\[
y = -4
\]

So, \( y = -4 \) when \( x = -12 \).

79. If \( y = 12 \) when \( x = 15 \), find \( x \) when \( y = -6 \).

**SOLUTION:**

\[
y = kx
\]

\[
12 = k(15)
\]

\[
\frac{12}{15} = k(15)
\]

\[
\frac{4}{5} = k
\]

So, the direct variation equation is \( y = \frac{4}{5}x \). Substitute \(-6\) for \( y \) and find \( x \).

\[
y = \frac{4}{5}x
\]

\[
-6 = \frac{4}{5}x
\]

\[
\frac{5}{4}(-6) = 5\left(\frac{4}{5}x\right)
\]

\[
-\frac{15}{2} = x
\]

\[
-7.5 = x
\]

So, \( x = -7.5 \) when \( y = -6 \).
Find the slope of the line that passes through each pair of points.

80. $(2, 3), (9, 7)$

**SOLUTION:**

\[
m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{7 - 3}{9 - 2} = \frac{4}{7}
\]

So, the slope is $\frac{4}{7}$.

81. $(-3, 6), (2, 4)$

**SOLUTION:**

\[
m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{6 - 4}{-3 - 2} = \frac{2}{-5} = -\frac{2}{5}
\]

So, the slope is $-\frac{2}{5}$.

82. $(2, 6), (-1, 3)$

**SOLUTION:**

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

So, the slope is 1.
4-1 Graphing Equations in Slope-Intercept Form

83. \((-3, 3), (1, 3)\)

\textbf{SOLUTION:}

\[
m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3 - 3}{1 - (-3)} = \frac{0}{4} = 0
\]

So, the slope is 0.