

### 3.5 Writing Equations of Lines

### Solutions

Write the equation in slope-intercept form, $y = mx + b$ , of the line with each given slope, $m$ and $y$ -intercept, $b$ .	
<p>1. <math>m = -5</math> and <math>b = 10</math>     <math>y = mx + b</math>  <math>y = -5x + 10</math></p>	<p>2. <math>m = 3</math> and <math>b = -1</math></p>
<p>3. <math>m = \frac{5}{6}</math> and <math>b = -2</math>     <math>y = mx + b</math>  <math>y = \frac{5}{6}x - 2</math></p>	<p>4. <math>m = -\frac{1}{4}</math> and <math>b = 5</math></p>
<p>5. <math>m = 0</math> and <math>b = 8</math>     <math>y = mx + b</math>  <math>y = 0x + 8</math>  <math>y = 8</math></p>	<p>6. <math>m = 0</math> and <math>b = -6</math></p>
<p>7. <math>m = \frac{1}{7}</math> and <math>b = 0</math>     <math>y = mx + b</math>  <math>y = \frac{1}{7}x + 0</math>  <math>y = \frac{1}{7}x</math></p>	<p>8. <math>m = -\frac{3}{4}</math> and <math>b = 0</math></p>
Write the equation in slope-intercept form, $y = mx + b$ , of the line that has the given slope, $m$ and passes through the given point.	
<p>9. slope is <math>-3</math> and passes through the point <math>(5, 6)</math>  <math>y - y_1 = m(x - x_1)</math>  <math>y - 6 = -3(x - 5)</math>  <math>y - 6 = -3x + 15</math>  <math>\quad \underline{+6} \qquad \quad \underline{+6}</math>  <math>y = -3x + 21</math></p>	<p>10. slope is <math>4</math> and passes through the point <math>(-1, 2)</math></p>
Answers: 1. $y = -5x + 10$ ; 3. $y = \frac{5}{6}x - 2$ ; 5. $y = 8$ ; 7. $y = \frac{1}{7}x$ ; 9. $y = -3x + 21$	

Write the equation in slope-intercept form,  $y = mx + b$ , of the line that has the given slope,  $m$  and passes through the given point.

**11.** slope is  $\frac{1}{2}$  and passes through the point  $(4, -5)$

$$\begin{aligned}
 y - y_1 &= m(x - x_1) \\
 y - (-5) &= \frac{1}{2}(x - 4) \\
 y + 5 &= \frac{1}{2}x - \frac{1}{2} \cdot 4 \\
 y + 5 &= \frac{1}{2}x - 2 \\
 \underline{-5} \quad \quad \underline{-5} \\
 y &= \frac{1}{2}x - 7
 \end{aligned}$$

**12.** slope is  $\frac{1}{3}$  and passes through the point  $(-9, 1)$

**13.** slope is  $0$  and passes through the point  $(2, 7)$

$$\begin{aligned}
 y - y_1 &= m(x - x_1) \\
 y - 7 &= 0(x - 2) \\
 y - 7 &= 0 \\
 \underline{+7} \quad \underline{+7} \\
 y &= 7
 \end{aligned}$$

**14.** slope is  $0$  and passes through the point  $(3, -8)$

**15.** slope is  $-\frac{2}{5}$  and passes through the point  $(0, 0)$

$$\begin{aligned}
 y - y_1 &= m(x - x_1) \\
 y - 0 &= -\frac{2}{5}(x - 0) \\
 y &= -\frac{2}{5}x
 \end{aligned}$$

**16.** slope is  $\frac{4}{3}$  and passes through the point  $(0, 0)$

Answers: **11.**  $y = \frac{1}{2}x - 7$ ; **13.**  $y = 7$ ; **15.**  $y = -\frac{2}{5}x$

Write the equation in slope-intercept form,  $y = mx + b$ , of the line that has the following characteristics

17. passes through the points

$(-3, 1)$  and  $(6, 4)$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{4 - 1}{6 - (-3)} = \frac{3}{9} = \frac{1}{3}$$

$$y - y_1 = m(x - x_1)$$

$$y - 1 = \frac{1}{3}(x - (-3))$$

$$y - 1 = \frac{1}{3}x + \frac{1}{3} \cdot 3$$

$$y - 1 = \frac{1}{3}x + 1$$

$$\underline{+1} \qquad \underline{+1}$$

$$y = \frac{1}{3}x + 2$$

18. passes through the points

$(-1, 3)$  and  $(2, -3)$

19. passes through the points

$(1, 3)$  and  $(3, 7)$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{7 - 3}{3 - 1} = \frac{4}{2} = 2$$

$$y - y_1 = m(x - x_1)$$

$$y - 3 = 2(x - 1)$$

$$y - 3 = 2x - 2$$

$$\underline{+3} \qquad \underline{+3}$$

$$y = 2x + 1$$

20. passes through the points

$(2, 4)$  and  $(1, 6)$

Answers: 17.  $y = \frac{1}{3}x + 2$ ; 19.  $y = 2x + 1$

Write the equation in slope-intercept form,  $y = mx + b$ , of the line that has the following characteristics

**21.** passes through the points

(1, 7) and (3, 7)

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{7 - 7}{3 - 1} = \frac{0}{2} = 0$$

$$y - y_1 = m(x - x_1)$$

$$y - 7 = 0(x - 1)$$

$$y - 7 = 0$$

$$\underline{+7} \quad \underline{+7}$$

$$y = 7$$

**22.** passes through the points

(2, 4) and (1, 4)

**23.** passes through the points

(3, 2) and (6, 4)

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{4 - 2}{6 - 3} = \frac{2}{3}$$

$$y - y_1 = m(x - x_1)$$

$$y - 2 = \frac{2}{3}(x - 3)$$

$$y - 2 = \frac{2}{3}x - \frac{2}{3} \cdot 3$$

$$y - 2 = \frac{2}{3}x - 2$$

$$\underline{+2} \quad \underline{+2}$$

$$y = \frac{2}{3}x$$

**24.** passes through the points

(-2, 4) and (1, -2)

Answers: **21.**  $y = 7$ ; **23.**  $y = \frac{2}{3}x$

Write the equation of the line in slope-intercept form,  $y = mx + b$  that has the following characteristics:

**25.** passes through  $(2, 4)$  and is parallel to  $y = \frac{1}{2}x - 1$ .

$$m = \frac{1}{2}$$

$$y - y_1 = m(x - x_1)$$

$$y - 4 = \frac{1}{2}(x - 2)$$

$$y - 4 = \frac{1}{2}x - \frac{1}{2} \cdot 2$$

$$y - 4 = \frac{1}{2}x - 1$$

$$\begin{array}{r} +4 \\ +4 \end{array}$$

$$y = \frac{1}{2}x + 3$$

**26.** passes through  $(2, 3)$  and is parallel to  $y = 3x - 9$ .

**27.** passes through  $(1, 2)$  and is perpendicular to  $y = \frac{1}{2}x - 1$ .

$$m = -2$$

$$y - y_1 = m(x - x_1)$$

$$y - 2 = -2(x - 1)$$

$$y - 2 = -2x + 2$$

$$\begin{array}{r} +2 \\ +2 \end{array}$$

$$y = -2x + 4$$

**28.** passes through  $(3, -2)$  and is perpendicular to  $y = 3x - 9$ .

Answers: **25.**  $y = \frac{1}{2}x + 3$ ; **27.**  $y = -2x + 4$