

Solutions

Page 182 #s 1 – 5, 7 – 9, 16, 17

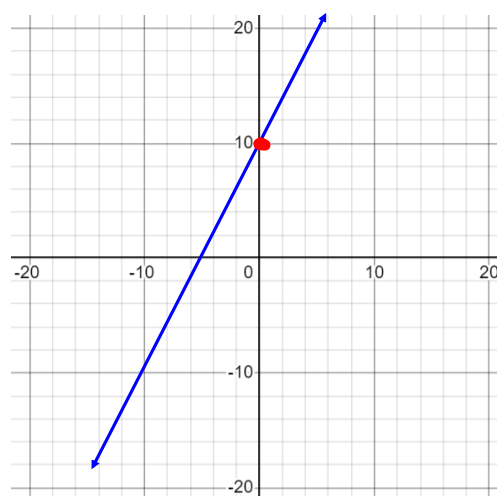
1. A line has a slope of 2 and passes through the point (3,16).

- Use the given point and slope to sketch a graph of the line.
- Use your graph to identify the line's y-intercept.
- Using the slope and y-intercept, write the equation of the line in $y = mx + b$ form.

b) y-intercept is (0,10)

c) Equation $y = mx + b$ is

$$y = 2x + 10$$



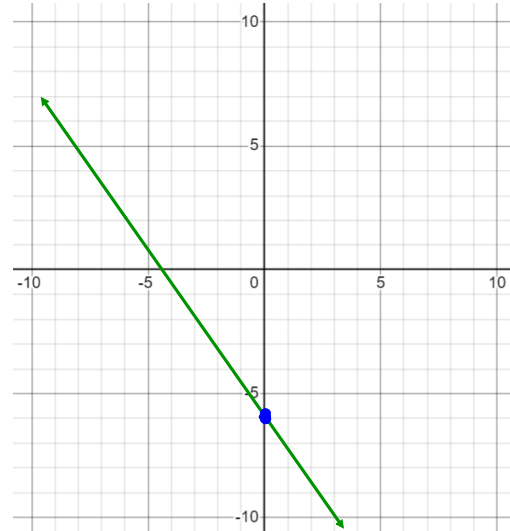
2. A line has a slope of $-\frac{4}{3}$ and passes through the point $(-3, -2)$.

- Use the given point and slope to sketch a graph of the line.
- Use your graph to identify the line's y -intercept.
- Using the slope and y -intercept, write the equation of the line in $y = mx + b$ form.

b) y -intercept is $(0, -6)$

c) Equation $y = mx + b$ is

$$y = -\frac{4}{3}x - 6$$



3. A line has a slope of 3 and passes through the point $(5, 27)$.

- Write the equation $y = mx + b$ with the given slope substituted for m .
- Rewrite your equation from part (a) with the coordinates of the given point substituted for x and y .
- Solve your equation from part (b) to determine the line's y -intercept, b .
- Write the equation of the line.

a) $y = 3x + b$

b) $27 = 3(5) + b$

c) $27 = 3(5) + b$
 $27 = 15 + b$

$27 - 15 = 15 + b - 15$
 $12 = b$

d) $y = 3x + 12$

4. A line has a slope of $\frac{5}{6}$ and passes through the point $(-12, -14)$.

- Write the equation $y = mx + b$ with the given slope substituted for m .
- Rewrite your equation from part (a) with the coordinates of the given point substituted for x and y .
- Solve your equation from part (b) to determine the line's y -intercept, b .
- Write the equation of the line.

$$a) y = \frac{5}{6}x + b$$

$$b) -14 = \frac{5}{6}(-12) + b$$

$$c) -14 = \frac{5}{6}(-12) + b$$

$$-14 = -10 + b$$

$$-14 + 10 = -10 + b + 10$$

$$-4 = b$$

$$d) y = \frac{5}{6}x - 4$$

5. Identify each of the following lines as either horizontal or vertical.

- a) $y = 8$ b) $y = -9$ c) $x = 10$ d) $y = \frac{7}{2}$ e) $x = -50$

Horizontal lines $y = \text{number}$

Vertical lines $x = \text{number}$

a) Horizontal

b) Horizontal

c) Vertical

d) Horizontal

e) Vertical

7. Find the equation of the line that has the given slope and passes through the given point.

a) Slope: 1

Point: (15, 31)

b) Slope: -9

Point: (5, -17)

c) Slope: 6

Point: (-4, -42)

d) Slope: 0

Point: (52, -63)

$$\begin{aligned} \text{a) } y &= 1x + b \\ 31 &= 1(15) + b \\ 31 &= 15 + b \\ 31 - 15 &= 15 + b - 15 \\ 16 &= b \\ \Rightarrow y &= 1x + 16 \\ y &= x + 16 \end{aligned}$$

$$\begin{aligned} \text{b) } y &= -9x + b \\ -17 &= -9(5) + b \\ -17 &= -45 + b \\ -17 + 45 &= -45 + b + 45 \\ 28 &= b \\ \Rightarrow y &= -9x + 28 \end{aligned}$$

7. Find the equation of the line that has the given slope and passes through the given point.

a) Slope: 1

Point: (15, 31)

b) Slope: -9

Point: (5, -17)

c) Slope: 6

Point: (-4, -42)

d) Slope: 0

Point: (52, -63)

$$\begin{aligned} \text{c) } y &= 6x + b \\ -42 &= 6(-4) + b \\ -42 &= -24 + b \\ -42 + 24 &= -24 + b + 24 \\ -18 &= b \\ \Rightarrow y &= 6x - 18 \end{aligned}$$

$$\begin{aligned} \text{d) } y &= 0x + b \\ -63 &= 0(52) + b \\ -63 &= b \\ \Rightarrow y &= 0x - 63 \\ y &= -63 \end{aligned}$$

8. Find the equation of the line that has the given slope and passes through the given point.

a) Slope: $\frac{1}{2}$

Point: (30,23)

$$a) y = \frac{1}{2}x + b$$

$$23 = \frac{1}{2}(30) + b$$

$$23 = 15 + b$$

$$23 - 15 = 15 + b - 15$$

$$8 = b$$

$$\Rightarrow y = \frac{1}{2}x + 8$$

b) Slope: $-\frac{4}{3}$

Point: (-15,0)

$$b) y = -\frac{4}{3}x + b$$

$$0 = -\frac{4}{3}(-15) + b$$

$$0 = 20 + b$$

$$0 - 20 = 20 + b - 20$$

$$-20 = b$$

$$\Rightarrow y = -\frac{4}{3}x - 20$$

c) Slope: $-\frac{5}{6}$

Point: (6,80)

d) Slope: $\frac{3}{4}$

Point: (-48,-61)

8. Find the equation of the line that has the given slope and passes through the given point.

a) Slope: $\frac{1}{2}$

Point: (30,23)

b) Slope: $-\frac{4}{3}$

Point: (-15,0)

c) Slope: $-\frac{5}{6}$

Point: (6,80)

d) Slope: $\frac{3}{4}$

Point: (-48,-61)

$$c) y = -\frac{5}{6}x + b$$

$$80 = -\frac{5}{6}(6) + b$$

$$80 = -5 + b$$

$$80 + 5 = -5 + b + 5$$

$$85 = b$$

$$\Rightarrow y = -\frac{5}{6}x + 85$$

$$d) y = \frac{3}{4}x + b$$

$$-61 = \frac{3}{4}(-48) + b$$

$$-61 = -36 + b$$

$$-61 + 36 = -36 + b + 36$$

$$-25 = b$$

$$\Rightarrow y = \frac{3}{4}x - 25$$

9. The relationship between an employee's annual salary and the number of years of experience is linear. For each additional year of experience, the annual salary increases by \$4000. An employee with 8 years of experience earns an annual salary of \$71 000.

- Determine the annual salary of an employee with no experience.
- Create an equation to relate annual salary (S) to years of experience (n).
- Determine the annual salary of an employee with 12 years of experience.

$$\begin{aligned} \text{a) } 8 \times \$4000 &= \$32,000 \text{ of increases} \\ \Rightarrow \text{No experience} &= \$71,000 - \$32,000 \\ &= \$39,000 \end{aligned}$$

$$\text{b) } S = 39,000 + 4000n$$

Salary, with no experience
(initial value)
rate of change
of pay

$$\begin{aligned} \text{c) Sub in } n &= 12 \\ S &= 39,000 + 4000(12) \\ S &= 39,000 + 48,000 \\ S &= \$87,000 \end{aligned}$$

16. Determine the equation of the line that is parallel to the line $y = 16$ and passes through $(5, 4)$.

$$\begin{aligned} y = 16 &\text{ is a horizontal line} \\ \Rightarrow \text{slope} &= 0 \end{aligned}$$

$$y = 0x + b$$

$$4 = 0(5) + b$$

$$4 = 0 + b$$

$$4 = b$$

$$\Rightarrow y = 0x + 4$$

$$y = 4$$

17. Determine the equation of the line that is perpendicular to $x = -9$ and passes through $(40, -85)$.

$x = -9$ is a vertical line

\Rightarrow perpendicular line will be horizontal

Horizontal lines have a slope of zero

$$\Rightarrow y = 0x + b$$

$$-85 = 0(40) + b$$

$$-85 = 0 + b$$

$$-85 = b$$

$$\Rightarrow y = 0x - 85$$

$$y = -85$$