Chapter 7

7.1 Slope-Intercept Form, pages 349 to 356

1. a) $m = -5$, y-intercept: $(0, 4)$

b) $m = \frac{3}{4}$, y-intercept: $(0, 1)$

c) $m = 1$, y-intercept: $(0, -7)$

d) $m = -4$, y-intercept: $(0, 0)$

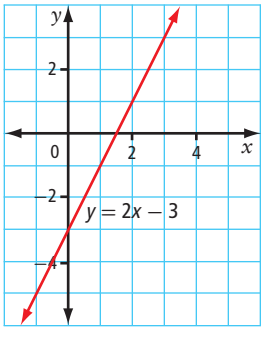
e) $m = 0$, y-intercept: $(0, -3)$

f) $m = 0.5$, y-intercept: $(0, -1.25)$

2. a) $m = -3$, y-intercept: $(0, 2)$

b) Example: Plot the point $(0, 2)$. From the point $(0, 2)$, go 3 units down and 1 unit to the right. Draw a line through the two points given.

3. a)



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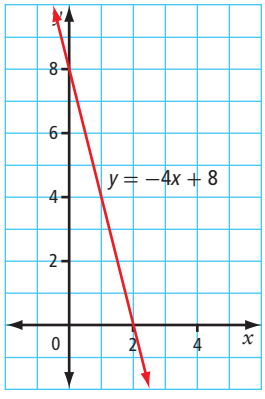

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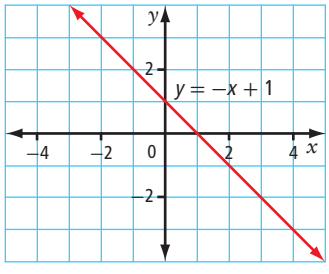

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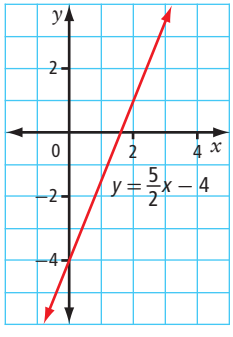

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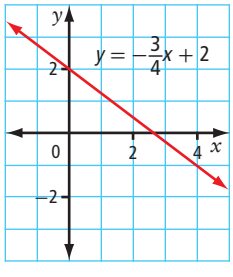

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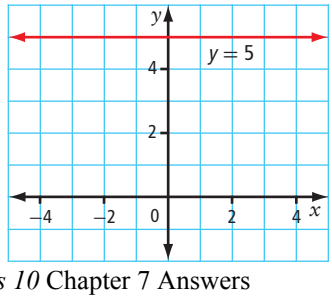


4. a) step 3

b) $y = \frac{3}{2}x - 4$; The slope of the line is $\frac{3}{2}$ and the y-intercept is -4.

5. a) $y = -2x + 6$; $m = -2$, y-intercept: $(0, 6)$

b) $y = -3x - 9$; $m = -3$, y-intercept: $(0, -9)$

c) $y = -\frac{5}{6}x + \frac{4}{3}$; $m = -\frac{5}{6}$, y-intercept: $\left(0, \frac{4}{3}\right)$

d) $y = 6x - 4$; $m = 6$, y-intercept: $(0, -4)$

e) $y = 7x + 9$; $m = 7$, y-intercept: $(0, 9)$

f) $y = 2x - \frac{3}{4}$; $m = 2$, y-intercept: $\left(0, -\frac{3}{4}\right)$

6. a) $y = -3x + 2$ **b)** $y = \frac{5}{6}x - 4$

c) $y = -0.75x - 5$ **d)** $y = x - 7$

e) $y = -x$ **f)** $y = \frac{1}{3}$

7. a) A and C; The slopes are positive.

b) B and D; The slopes are negative.

c) C, B, D, A

d) D

8. a) $m = 4$, y-intercept: $(0, 4)$; $y = 4x + 4$

b) $m = -\frac{1}{2}$, y-intercept: $(0, -1)$; $y = -\frac{1}{2}x - 1$

c) $m = -2$, y-intercept: $(0, 6)$; $y = -2x + 6$

d) $m = \frac{2}{3}$, y-intercept: $(0, 4)$; $y = \frac{2}{3}x + 4$

e) $m = 0$, y-intercept: $(0, -2.5)$; $y = -2.5$

f) $m = \frac{2}{5}$, y-intercept: $(0, 4)$; $y = \frac{2}{5}x + 4$

9. a) -3 **b)** 18 **c)** -11 **d)** -5

10. a) 1 **b)** -5 **c)** $-\frac{3}{2}$ **d)** $-\frac{1}{6}$

11. Examples: $y = \frac{13}{5}x + 64$ and $y = -\frac{13}{5}x + 64$

12. a) $m = -2$, y-intercept: $(0, 3)$; Graph C

b) $m = 2$, y-intercept: $(0, -3)$; Graph D

c) $m = \frac{1}{2}$, y-intercept: $(0, -3)$; Graph B

d) $m = -\frac{1}{2}$, y-intercept: $(0, 3)$; Graph A

13. a) $C = 300 + 6.25n$

b) $T = 3.60 + 1.48x$

c) $D = 1024 + 54t$

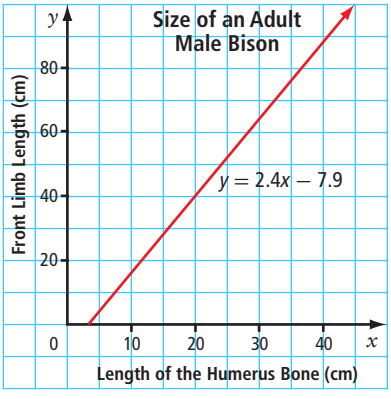
d) $L = 2500 - 120t$

14. $y_1 = \frac{10}{3}x + 10$, $y_2 = -\frac{10}{3}x + 10$,
$y_3 = -\frac{10}{3}x - 10$, $y_4 = \frac{10}{3}x - 10$, $y_5 = -x$, $y_6 = x$,
$y_7 = -\frac{3}{10}x + 3$, $y_8 = \frac{3}{10}x + 3$, $y_9 = -\frac{3}{10}x - 3$,
$y_{10} = \frac{3}{10}x - 3$

15. a) spring 1: $L = \frac{3}{2}x + 8$, spring 2: $L = -\frac{3}{2}x + 24$

b) Example: The mass is sitting on top of the spring instead of being suspended from it. The length of spring 2 compresses by 1.5 cm per gram.

16. a)

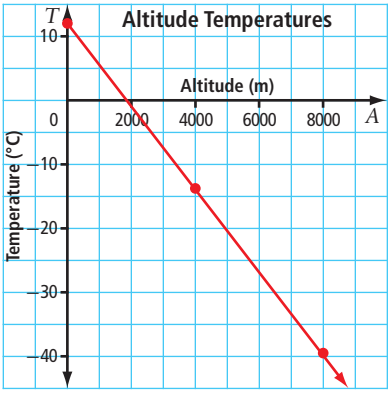


b) 89 cm, 70 cm

c) 26%

17. $y = -3x + 7$

18. a)



b) $m = -\frac{4}{625}$; The temperature drops 4 °C for every 625 m increase in altitude.

c) y-intercept: (0, 12); The temperature at ground level is 12 °C.

d) $T = -\frac{4}{625}A + 12$

e) −26.1 °C

f) above 5000 m

19. $y = -\frac{1}{4}x + 4$

20. −20

21. −9

22. $y = x + 3$

23. 99 points

24. a) Example: To determine the slope, apply the slope formula using two of the points from the table. To determine the y-intercept, look for the corresponding y-coordinate when the x-coordinate is 0.

b) Example: To determine the slope, find two points on the graph and apply the slope formula. To determine the y-intercept, read the value of y when $x = 0$ from the graph.

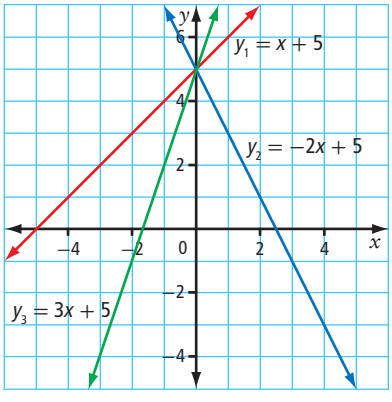
c) Example: The slope is the value of m, and the y-intercept is the value of b.

25. a) Example: Write the equation of the line in the form $y = mx + b$, where m is the slope and b is the y-intercept.

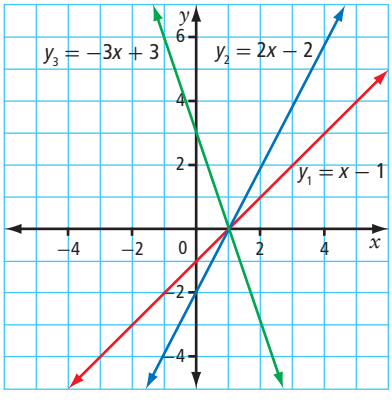
b) Example: Start with the y-intercept and then use the slope to determine a second point. Draw the line passing through the two points.

26. Step 1:

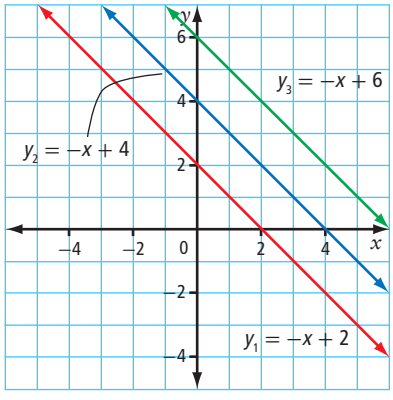
a)



b)



c)



Step 2: Examples:

a) same y-intercept but different slopes

b) same x-intercept but different slopes

c) same slope but different y-intercepts; parallel lines

Step 3: Examples:

a) $y = -x + 5$

b) $y = -x + 1$

c) $y = -x - 2$

Step 4: Example: $y_1 = 2x$, $y_2 = -x$, $y_3 = 3x$; All lines pass through the origin, (0, 0).

7.2 General Form, pages 365 to 369

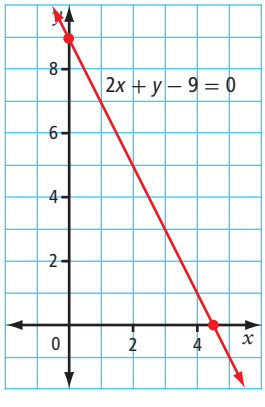
1. Jasmine forgot to multiply 4 by 2. $3x + 2y - 8 = 0$

2. a) $7x - y - 5 = 0$ **b)** $x + y - 8 = 0$

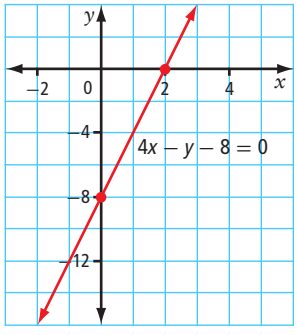
c) $3x - 2y + 8 = 0$ **d)** $3x + 5y + 10 = 0$

e) $5x - 20y - 6 = 0$ **f)** $20x + 8y - 1 = 0$

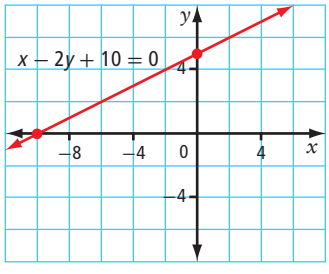
3. a) x-intercept: $\left(\frac{9}{2}, 0\right)$, y-intercept: (0, 9)



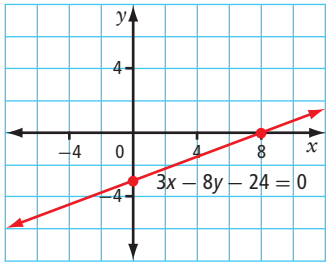
b) x-intercept: (2, 0), y-intercept: (0, −8)



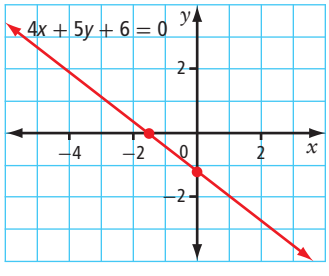
c) x-intercept: (−10, 0), y-intercept: (0, 5)



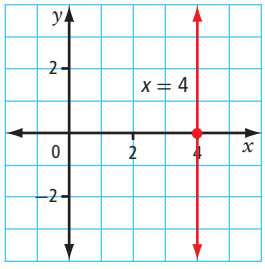
d) x-intercept: (8, 0), y-intercept: (0, −3)



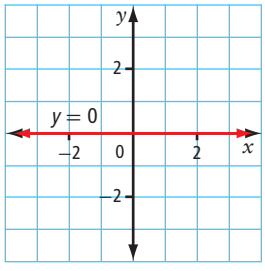
e) x-intercept: $\left(-\frac{3}{2}, 0\right)$, y-intercept: $\left(0, -\frac{6}{5}\right)$



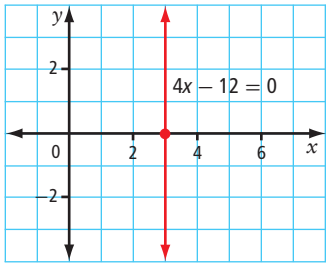
f) x-intercept: (4, 0), no y-intercept



g) $\{x \mid x \in \mathrm{R}\}$, y-intercept: (0, 0)



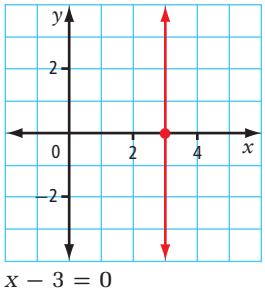
h) x-intercept: (3, 0), no y-intercept



4. a) domain: $\{x \in \mathrm{R}\}$, range: $\{2\}$, no x-intercept, y-intercept: (0, 2), $m = 0$; $y - 2 = 0$

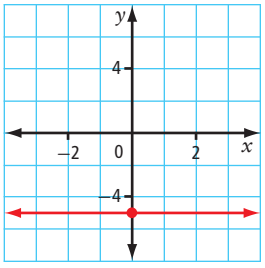
b) domain: $\{-3\}$, range: $\{y \in \mathrm{R}\}$, no y-intercept, x-intercept: $(-3, 0)$, slope is undefined; $x + 3 = 0$

5. a)



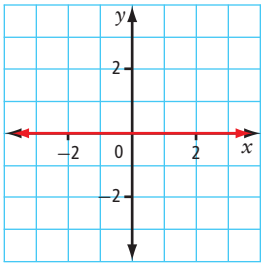
$x - 3 = 0$

b)



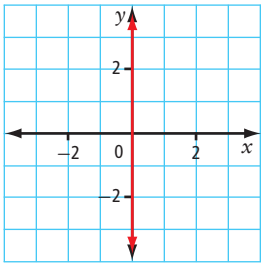
$y + 5 = 0$

c)



$y = 0$

d)



$x = 0$

6. a) 2 **b)** 4 **c)** 8 **d)** 5
e) 3 **f)** 6 **g)** 7 **h)** 1

7. a) $x - 3 = 0$ **b)** $y - 6 = 0$
c) $y = 0$ **d)** $x = 0$

8. $x - 3 = 0$

9. Let g represent the number of 125-mL servings of green peas. Let b represent the number of 125-mL servings of baked beans. Let B represent the number of 125-mL servings of bran buds.
$4g + 16B - 21 = 0$ or $7b + 16B - 21 = 0$;
green peas: 157 mL; baked beans: 90 mL
Note that answers were rounded up to ensure the desired amount of each vegetable was consumed. If the answers had been rounded down, the desired amounts would not have been achieved.

10. a) y-intercept: (0, 1200); The distance between Saskatoon and Vancouver is 1200 km. x-intercept: (2.0, 0); It takes 2 h to fly from Saskatoon to Vancouver.

b) domain: $\{x \mid 0 \leq x \leq 2, x \in \mathrm{R}\}$, range: $\{y \mid 0 \leq y \leq 1200, y \in \mathrm{R}\}$

c) $m = -600$; The speed of the plane is 600 km/h.

d) $600x + y - 1200 = 0$

e) 1 h 40 min

f) 750 km

11. a) $8x + 11y = 440$

b) x-intercept: (55, 0); Luc needs to swim backstroke for 55 min in order to burn 440 cal. y-intercept: (0, 40); Luc needs to swim butterfly for 40 min in order to burn 440 cal.

c) 33 min

12. a) $1200x + 1800y = 10\ 000$

b) approximately 0.50 m^3

c) approximately 6%

13. a) $8a + 12d - 1120 = 0$

b) Example: Find the a-intercept and the d-intercept and draw the line passing through these two points.

c) 80 advance tickets, 40 tickets at the door

14. a) $\frac{4}{3}$ **b)** 3 **c)** -10

15. a) (6, 6) **b)** (12, 4) **c)** (3, 7)

16. -4

17. a) 25 square units

b) 49 square units

18. a) Example: I prefer the slope-intercept form, because it is easy to find two points on the graph.

b) Example: Use the general form to find the x-intercept.

19. a) Example: Substitute $y = 0$ in the equation and solve for x.

b) Example: Substitute $x = 0$ into the equation and solve for y, or rewrite the equation in slope-intercept form.

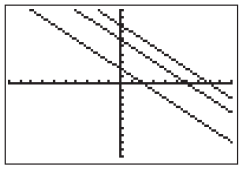
20. a) vertical

b) horizontal

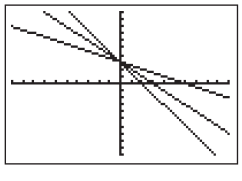
c) oblique

21. Step 1:

a)



b)



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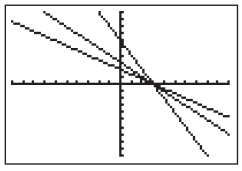
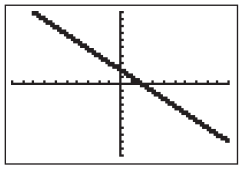


d)



Step 2:

a) parameter C; If only parameter C is changed, the graphs of the equations will have the same slope but different x-intercepts and y-intercepts.

b) parameter A; If only parameter A is changed, the graphs of the equations will have the same y-intercept but different slopes and x-intercepts.

c) parameter B; If only parameter B is changed, the graphs of the equations will have the same x-intercept but different slopes and y-intercepts.

d) All parameters have changed so that the second and third equations are multiples of the first equation. When parameters A, B, and C of one equation are multiples of those of another equation, the graphs represent the same line.

Step 3: Example: Parameters A and B influence the slope of the line, while parameter C influences the x-intercept and y-intercept.

7.3 Slope-Point Form, pages 377 to 382

1. a) $y = x - 8$, $x - y - 8 = 0$

b) $y = 2x + 2$, $2x - y + 2 = 0$

c) $y = 4x + 10$, $4x - y + 10 = 0$

d) $y = -5x - 17$, $5x + y + 17 = 0$

e) $y = -\frac{1}{2}x - 1$, $x + 2y + 2 = 0$

f) $y = -\frac{2}{3}x - 5$, $2x + 3y + 15 = 0$

2. a) $y - 2 = 2(x - 3)$

b) $y + 3 = -\frac{3}{2}(x - 1)$

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

d) $y - 2 = -\frac{1}{3}(x + 4)$

3. a) $y + 2 = 6(x - 5)$, $y = 6x - 32$, $6x - y - 32 = 0$

b) $y + 5 = -2(x + 3)$, $y = -2x - 11$, $2x + y + 11 = 0$

c) $y - 3 = \frac{1}{2}(x + 8)$, $y = \frac{1}{2}x + 7$, $x - 2y + 14 = 0$

d) $y + 6 = -\frac{2}{3}(x - 12)$, $y = -\frac{2}{3}x + 2$, $2x + 3y - 6 = 0$

4. a) $m = \frac{2}{3}$, (6, 1)

b) Example: From the point (6, 1), go 2 units up and 3 units right to find the second point. Draw the line passing through the two points.

5. Examples:

a) $y - 1 = 4(x - 1)$

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

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

d) $y + 1 = \frac{2}{3}(x - 0)$

6. a) $y - 1 = 4(x - 5)$, $y = 4x - 19$, $4x - y - 19 = 0$

b) $y + 8 = -3(x - 5)$, $y = -3x + 7$, $3x + y - 7 = 0$

c) $y - 5 = -\frac{1}{2}(x - 4)$, $y = -\frac{1}{2}x + 7$, $x + 2y - 14 = 0$

d) $y + 3 = \frac{3}{4}(x - 8)$, $y = \frac{3}{4}x - 9$, $3x - 4y - 36 = 0$

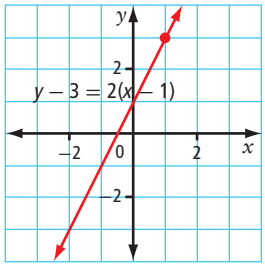
e) $y + 1 = \frac{3}{2}(x - 5)$, $y = \frac{3}{2}x - \frac{17}{2}$, $3x - 2y - 17 = 0$

f) $y - 6 = \frac{3}{2}(x - 3)$, $y = \frac{3}{2}x + \frac{3}{2}$, $3x - 2y + 3 = 0$

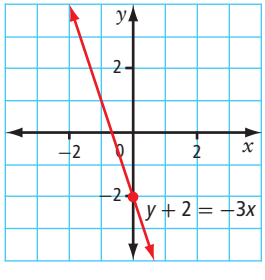
7. a) Example: Compare the graphs of the equations using slope-point form, or rewrite the equations in slope-intercept form and compare the equations.

b) 1 and 4, 2 and 3; In slope-intercept form, the equations in each pair are the same.

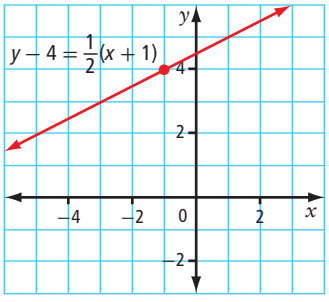
8. a) $m = 2$, (1, 3)



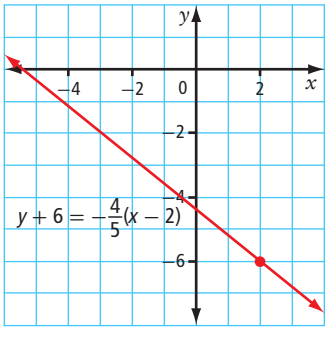
b) $m = -3$, (0, −2)



c) $m = \frac{1}{2}$, (−1, 4)



d) $m = -\frac{4}{5}$, (2, −6)



9. a) Example: Find the slope and use one of the points in slope-point form or in slope-intercept form of the equation. Plot the two points and draw the line that passes through them. Read the y-intercept from the graph.

b) 10

10. a) $y = 2x + 1$

b) Example: $y - 7 = 2(x - 3)$

c) same graph

11. a) $y + 5 = 0(x - 4)$, $y = -5$

b) $y - 4 = -3(x + 2)$, $y = -3x - 2$

c) $y - 0 = \frac{1}{2}(x - 8)$, $y = \frac{1}{2}x - 4$

d) $y + 4 = -2(x - 3)$, $y = -2x + 2$

12. a) $y - 0 = 3(x - 4)$, $3x - y - 12 = 0$

b) $y + 1 = -4(x - 2)$, $4x + y - 7 = 0$

c) $y - 2 = -\frac{1}{2}(x - 0)$, $x + 2y - 4 = 0$

d) $y + 6 = 3(x - 0)$, $3x - y - 6 = 0$

13. a) $V - 29 = 1.2(t - 24)$

b) 129 h

c) No. The tank contained 0.2 m^3 before it started filling.

14. a) $\frac{3}{5}$

b) 0.6 m/s/°C

c) $V - 335 = \frac{3}{5}(t - 6)$

d) 352.4 m/s

e) approximately 28 °C

15. -2

16. -3

17. a) (1, 30) and (9, 33.7)

b) $m = 0.4625$

c) 462 500 people/year

d) $p - 30 = 0.4625(t - 1)$

e) 37.4 million people

18. a) Example: $p - 30 = \frac{3}{5}(n - 0)$, where p represents the number of grams of protein in the dinner and n represents the number of yellow potatoes that are eaten.

b) $m = \frac{3}{5}$; It represents 0.6 g protein per yellow potato.

c) p-intercept = 30; The steak contains 30 g of protein.

d) Example: domain: $\{n \mid 0 \leq n \leq 5, n \in \text{W}\}$, range: $\{p \mid 0 \leq p \leq 33, p \in \text{R}\}$

19. $y = m(x - n)$

20. $y + 4 = \frac{1}{2}(x + 4)$

21. Substitute the coordinates of the y-intercept, $(0, b)$.

22. Example: two points, slope and one point, relationships with other lines

23. Example: $y = mx + b$ for questions about slope or y-intercept; $y - y_1 = m(x - x_1)$ for questions involving two points or a point and slope

24. Step 1: Example:

Length of Humerus Bone (cm)	Person's Height (cm)
36	176
40	177

Step 3: The equation of the line passing through these two points is $y = 0.25x + 167$.

Step 4: Example: For a measurement of 37 cm, the predicted height of the teacher is 176.25 cm or approximately 176 cm.

7.4 Parallel and Perpendicular Lines, pages 390 to 395

1. a) $m = 5$; $m = -\frac{1}{5}$

b) $m = -7$; $m = \frac{1}{7}$

c) $m = -\frac{1}{3}$; $m = 3$

d) $m = \frac{6}{7}$; $m = -\frac{7}{6}$

e) $m = 0.5$; $m = -2$

f) $m = -0.75$; $m = \frac{4}{3}$

g) $m = 0$, m is undefined

h) m is undefined, $m = 0$

2. a) $m = \frac{3}{7}$, $m = -\frac{7}{3}$

b) $m = -1$, $m = 1$

c) $m = -3$, $m = \frac{1}{3}$

d) $m = -2$, $m = \frac{1}{2}$

e) $m = \frac{3}{2}$, $m = -\frac{2}{3}$

f) $m = -\frac{5}{4}$, $m = \frac{4}{5}$

g) $m = 0$, m is undefined

h) m is undefined, $m = 0$

3. a) $m = -2$ **b)** $m = \frac{1}{2}$

4. a) $n = 20$; $n = -5$

b) $n = -72$; $n = 8$

c) $n = \frac{27}{2}$; $n = -6$

d) $n = -\frac{6}{7}$; $n = \frac{21}{2}$

5. a) neither; The slopes are neither equal nor negative reciprocals.

b) perpendicular; The slopes are negative reciprocals.

c) parallel; The slopes are equal.

d) perpendicular; The slopes are negative reciprocals.

e) neither; The slopes are neither equal nor negative reciprocals.

f) perpendicular; The slopes are negative reciprocals.

6. a) $y = 2x - 8$ **b)** $y = -3x - 1$

c) $y = -5x + 7$ **d)** $y = 3x - 14$

e) $y = 4$ **f)** $x = -1$

7. a) $y = -\frac{1}{3}x + 8$ **b)** $y = \frac{1}{4}x - 4$

c) $y = 3x - 24$ **d)** $y = -\frac{3}{4}x - \frac{5}{2}$

e) $y = 7$ **f)** $x = 4$

8. a) Example: No. You have to prove it mathematically.

b) Example: Calculate and compare the slopes of the two lines. If the slopes are equal, then the lines are parallel.

c) No. Since $m_{AB} = \frac{1}{3}$ and $m_{CD} = \frac{1}{2}$, the two line segments are not parallel.

9. Yes. Example: Since $m_{AB} = m_{CD} = -\frac{2}{7}$, side AB is parallel to side CD. Since $m_{AD} = m_{BC} = -3$, side AD is parallel to side BC. Therefore, ABCD is a parallelogram, because opposite sides are parallel.

10. a) $y - 5 = 0$ **b)** $x - 7 = 0$

11. a) $n = -8$ **b)** $n = 5$

12. Example: $m_{AB} = \frac{2}{7}$ and $m_{AC} = -\frac{7}{2}$. Since the slopes of sides AB and AC are negative reciprocals, AB and AC are perpendicular to each other, and $\triangle ABC$ is a right triangle.

13. a) $y = -5x - 6$

b) $y = 5x - 3$

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

14. $y = 2x - 1$

15. $n = -8$

16. $y = -3x + 16$

17. Example: No. The slopes of the two graphs are not equal.

18. Example: $y_1 = \frac{14}{23}x + \frac{42}{23}$, $y_2 = \frac{14}{23}x$, $y_3 = \frac{14}{23}x - 2$; Note: The slope of the middle line is parallel to the other two lines.

19. $n = -10$

20. $n = 3$

21. $\frac{\sqrt{5}}{5}$ units; It is the perpendicular distance between the lines.

22. (1, 0) and (4, 0)

23. $n = 6$, $n = -6$

24. $n = 0$

25. Example: Sometimes true. Vertical and horizontal lines are perpendicular to each other. However, their slopes are not negative reciprocals. For oblique lines, it is always true.

26. Example: I would prefer to use the slope-intercept or slope-point form, because it is easy to compare the slopes.

Chapter 7 Review, pages 396 to 398

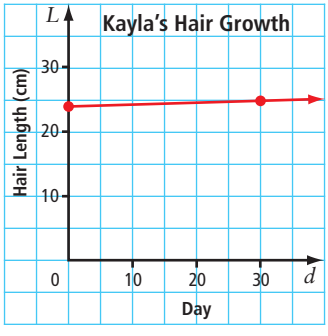
1. a) $m = -5$, y-intercept: (0, 6)

b) $m = \frac{5}{6}$, y-intercept: (0, 2)

2. a) Substitute $-\frac{4}{5}$ for m and 6 for b in $y = mx + b$. $y = -\frac{4}{5}x + 6$

b) Substitute 0 for m and -8 for b in $y = mx + b$. $y = -8$

3. a)



b) $m = 0.04$; Kayla's hair grows 0.04 cm per day.

c) y-intercept: (0, 24); Kayla's starting hair length is 24 cm.

d) $L = 0.04d + 24$

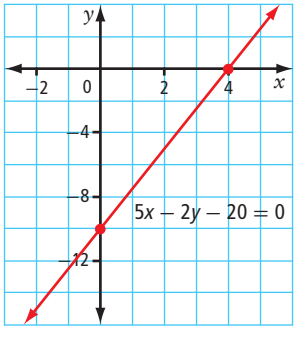
e) 53.2 cm

4. Example: Express the equation in slope-intercept form. Start from the y-intercept, 4, on the y-axis. Locate another point by moving 2 units down and 5 units to the right, since the slope is $-\frac{2}{5}$. Draw a line through the points, (0, 4) and (5, 2).

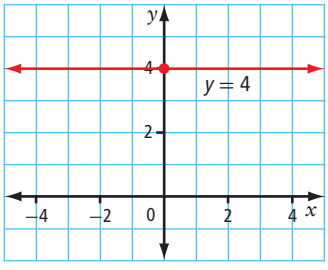
5. a) (0, 6), (−2, 0); $3x - y + 6 = 0$

b) (3, 0), no y-intercept; $x - 3 = 0$

6. a) x-intercept: (4, 0), y-intercept: (0, −10)



b) no x-intercept, y-intercept: (0, 4)



7. a) Let b represent the number of bannock wheels sold. Let c represent the number of buffalo burgers sold. $2b + 3c - 600 = 0$

b) b-intercept = 300; If they sold only bannock wheels, they would have sold 300. c-intercept = 200; If they sold only buffalo burgers, they would have sold 200.

c) domain: $\{b \mid 0 \leq b \leq 300, b \in \text{W}\}$, range: $\{c \mid 0 \leq c \leq 200, c \in \text{W}\}$

d) 110 buffalo burgers

8. a) $y - 1 = -4(x + 2)$, $y = -4x - 7$, $4x + y + 7 = 0$

b) $y + 3 = \frac{1}{2}(x - 8)$, $y = \frac{1}{2}x - 7$, $x - 2y - 14 = 0$

9. Example: Find the slope using the two points: $m = -4$. Write the equation in slope-point form using the slope and one of the points: $y - 2 = -4(x - 3)$. $y = -4x + 14$ or $4x + y - 14 = 0$

10. a) $m = -0.0035$; The temperature at which water boils decreases by 0.0035 °C for every metre increase in altitude.

b) $T = -0.0035d + 100$

c) 86 °C

11. a) $m = \frac{5}{2}$ **b)** $m = -\frac{2}{5}$

12. a) $n = -12$ **b)** $n = 27$

13. a) A and D, A and E, D and E; The slopes are equal but the intercepts are different.

b) B and A, B and D, B and E; The slopes are negative reciprocals.

c) D and E; The equations of the lines are the same.

14. $y = 2$; Example: The slope of $y = -7$ is 0 and the graph is a horizontal line. Therefore, the equation of a horizontal line through $(-1, 2)$ is $y = 2$.

15. $4x - 3y + 45 = 0$; Example: Determine the slope of the given line. Then, substitute the negative reciprocal of that slope and the coordinates of the given point into the slope-point form. Express in general form.

16. Example: First, determine that the slope of $2x + 5y + 10 = 0$ is $-\frac{2}{5}$. The slope of a line perpendicular to this one is $\frac{5}{2}$. Next, determine that the x-intercept of $3x - 2y = 12$ is 4. Then, use $m = \frac{5}{2}$ and (4, 0) to write the equation of the line in slope-point form. Express it in general form. $5x - 2y - 20 = 0$

17. $y = -\frac{4}{3}x + 18$

Chapter 7 Practice Test, pages 399 to 401

1. C

2. B

3. B

4. C

5. A

6. A

7. a) The product of their slopes is -1.

b) $n = 9$

8. $x - 2 = 0$

9. a) Let a represent the number of adult tickets sold. Let s represent the number of student tickets sold. $10a + 6s = 2900$

b) 125 adult tickets

10. A, C, and D; Once expressed in slope-intercept form, they all have the same equation.

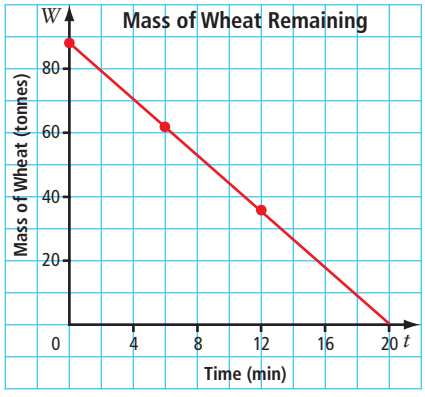
11. a) D-intercept: (0, 30); This represents the total length of the trail: 30 km.

b) Example: The equations of the two scenarios represent parallel lines, since they will have the same slope. Parallel lines never intersect. Therefore, Felicia will never catch up to Jacob.

12. $5x + y - 14 = 0$; Example: First, determine that the slope of $5x + y - 1 = 0$ is -5. A parallel line will have the same slope. Use $m = -5$ and $(3, -1)$ to write an equation in slope-point form, and then express it in general form.

13. Example: 1) Plot the point $(-3, 4)$ and use the slope of -2 to locate another point. Draw a line through the two points. 2) Express the equation in slope-intercept form. Then, use the slope of -2 and the y-intercept of -2 to draw the graph of the line. 3) Express the equation in general form. Then, find the intercepts and use these to draw the graph of the line.

14. a)



b) $W = -4.4t + 88$

c) t-intercept $= 20$; After 20 min, the car is empty. W-intercept $= 88.0$; Before unloading, there is 88.0 tonnes of grain in the railway car.

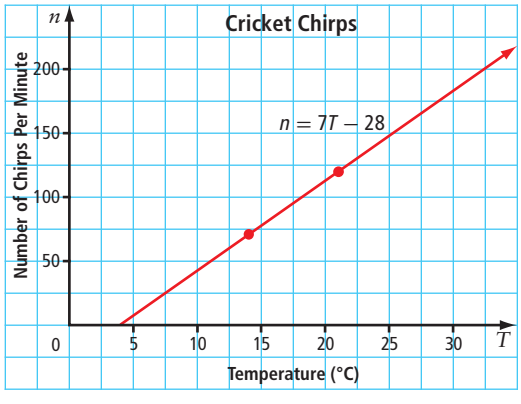
d) $m = -4.4$; The railway car is unloaded at a rate of 4.4 tonnes per minute.

e) domain: $\{t \mid 0 \leq t \leq 20, t \in \mathrm{R}\}$, range: $\{W \mid 0 \leq W \leq 88.0, W \in \mathrm{R}\}$

f) 10 min

15. a) $n = 7T - 28$

b) Example: Plot the two points (14, 70) and (21, 119) and draw a line through them.

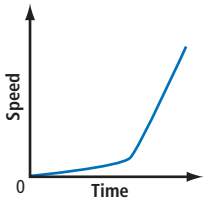


c) 28 °C

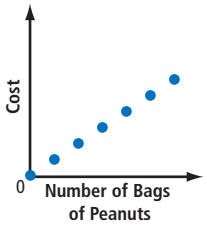
Unit 3 Review, pages 406 to 407

1. Examples:

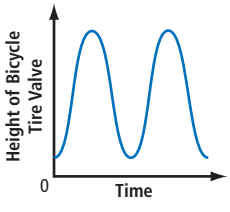
a) Time is greater than or equal to zero and stops when the rider is at the bottom of the hill. The relation is continuous.



b) The number of bags of peanuts bought must be a whole number. The relation is discrete.



c) Time is greater than or equal to zero. The relation is continuous.



2. Examples:

a) The height of a plant over time.

b) After coming home from school, Timmy visited his friend and returned home again.

3. a)

Weeks Worked	Earnings ($)
0	0
1	875
2	1750
3	2625
4	3500
5	4375

b) This relation is a function. Each domain value occurs only once.

c) The relation is discrete, since Rachel is only paid daily.

d) Let E represent Rachel's weekly earnings, in dollars. Let n represent the number of weeks worked. $E = 875n$

4. a) function **b)** function
c) function **d)** not a function

5. a) independent variable: time, dependent variable: litres of blood

b) $m = 5$

c) A human heart can pump 5 L of blood per minute.

6. a) function **b)** non-function

7. $\frac{2}{3}$, 2, 0

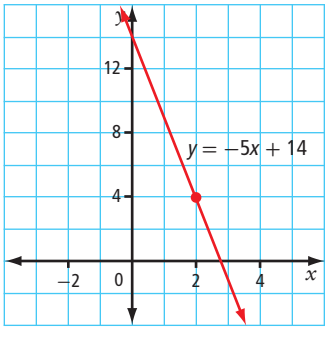
8. a) $m = \frac{1}{2}$, y-intercept: (0, 6)

b) $m = -\frac{3}{5}$, y-intercept: (0, 2)

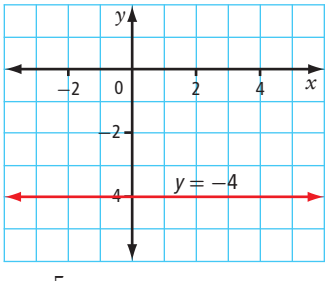
c) $m = \frac{1}{3}$, y-intercept: (0, 0)

d) $m = 0$, y-intercept: (0, −1)

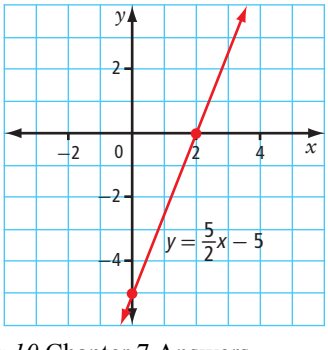
9. a) $y = -5x + 14$



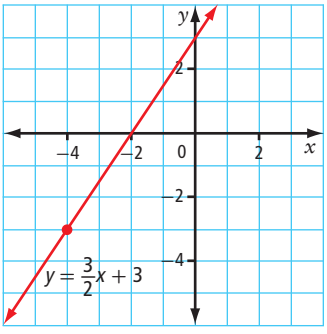
b) $y = -4$



c) $y = \frac{5}{2}x - 5$



d) $y = \frac{3}{2}x + 3$



10. a) (0, 6) and (4, 0); $3x + 2y - 12 = 0$

b) (0, 3) and (−2, 0); $3x - 2y + 6 = 0$

11. a) $x - 1 = 0$

b) $3x + 5y + 21 = 0$

Unit 3 Test, pages 408 to 409

1. C

2. D

3. B

4. D

5. A

6. 3

7. 2

8. a) $\{n \mid 0 \leq n \leq 8.5, n \in \mathrm{R}\}$, where n represents the number of hours you study.

b)

Number of Hours of Study	Mark (%)
0	32
1	40
2	48
3	56
4	64

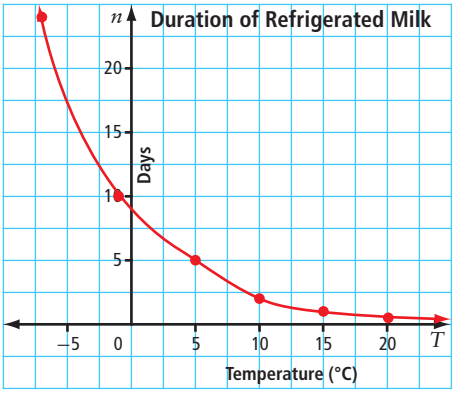
c) $M = 8n + 32$, where n represents the number of hours you study and M represents the predicted mark as a percent.

d) 8.5 h

e) Example: No, a linear model is not a valid model because there are many factors that can affect performance on an exam other than hours of study.

9. $2x + y + 6 = 0$

10. a)



b) 8 days

11. a) Example: The equation contains two variables and is of degree one. For each domain value there will be only one range value.

b) discrete; The cost for the lessons is based on half hour increments.

c) Example: (0, 25), (0.5, 40), (1, 55), (1.5, 70), (2, 85)

d) 3.5 h