

CHAPTER 2

Think & Discuss (p. 65)

- Enrollment tends to increase throughout the period.
- Estimate the growth trend with a line, and use the line to predict future enrollment.

Skill Review (p. 66)

$$1. \frac{y-7}{x-3} = \frac{5-7}{2-3} = \frac{-2}{-1} = 2$$

$$2. \frac{5-y}{6-x} = \frac{5-1}{6-4} = \frac{4}{2} = 2$$

$$3. \frac{8-y}{3-x} = \frac{8+4}{3+1} = \frac{12}{4} = 3$$

$$4. 3x + y = 4$$

$$y = 4 - 3x$$

$$5. x - 2y = 10$$

$$-2y = 10 - x$$

$$y = -5 + \frac{1}{2}x$$

$$6. 5x + 6y = -60$$

$$6y = -60 - 5x$$

$$y = -10 - \frac{5}{6}x$$

$$7. 2x + 9 < 18$$

$$2x < 9$$

$$x < \frac{9}{2}$$

$$8. 6 - 0.5y \leq 19$$

$$-0.5y \leq 13$$

$$y \geq -26$$

$$9. 2x + 3 > 6x - 7$$

$$-4x > -10$$

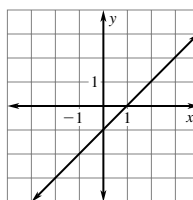
$$x < \frac{5}{2}$$

Lesson 2.1

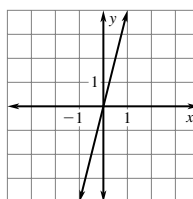
2.1 Guided Practice (p. 71)

- The domain is the set of input values and the range is the set of output values.
- Sample answer:* A relation is not a function if any input values map to more than a single output value. If this is the case, the vertical line at that input value will contain more than one point of a graph.
- Sample answer:* First, construct a table of values for the equation. Then plot enough of these points that a pattern can be seen. Then connect the points with a line or a curve.
- domain: $-3, -2, -1, 1, 2, 3$
range: $-2, 0, 2$
function

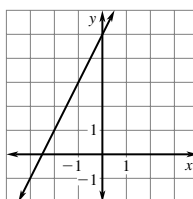
x	-2	-1	0	1	2
y	-3	-2	-1	0	1



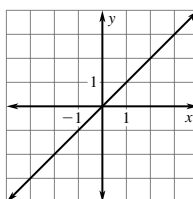
x	-2	-1	0	1	2
y	-8	-4	0	4	8



x	-2	-1	0	1	2
y	1	3	5	7	9



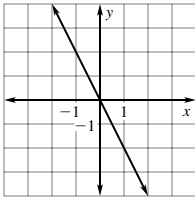
x	-2	-1	0	1	2
y	-2	-1	0	1	2



Chapter 2 continued

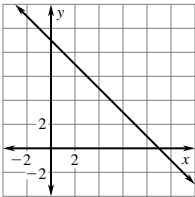
9.

x	-2	-1	0	1	2
y	4	2	0	-2	-4



10.

x	-2	-1	0	1	2
y	11	10	9	8	7



11. $f(3) = 3$ 12. $f(3) = 6(3) = 18$ 13. $f(3) = (3)^2 = 9$

14. $g(3) = 2(3) + 7 = 6 + 7 = 13$

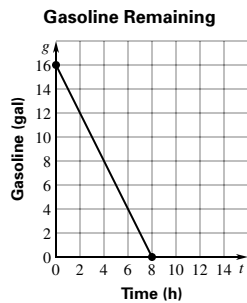
15. $h(3) = -(3)^2 + 10 = -9 + 10 = 1$

16. $j(3) = (3)^3 - 7(3) = 27 - 21 = 6$

17. domain: $0 \leq t \leq 8$

range: $0 \leq g \leq 16$

t	0	2	4	6	8
g	16	12	8	4	0



18. $2 = 16 - 2t$

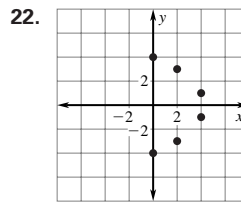
$2t = 14$

$t = 7$ h

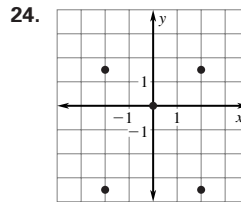
2.1 Practice and Applications (pp. 71–74)

19. domain: $-1, 2, 5, 6$ 20. domain: $-3, 1, 5$
 range: $-2, 3$ range: $-2, -1, 3, 4$

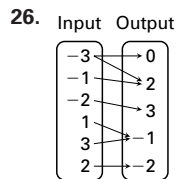
21. domain: $1, 2, 3, 4$
 range: $1, 2, 3, 4$



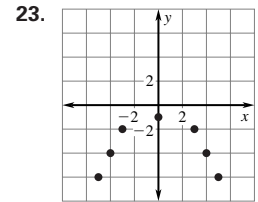
no



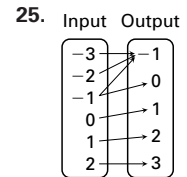
no



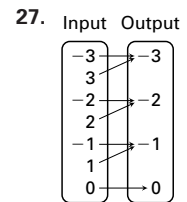
no



yes



no



yes

28. Yes; no; *Sample answer:* A function is always a relation, but a relation is not always a function. Any set of ordered pairs is a relation, but only those sets that do not map the same input value to more than one output value are functions.

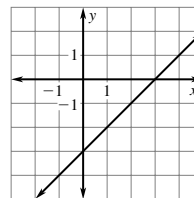
29. *Sample answer:* If a relation is a function, then no vertical line intersects the graph of the relation at more than one point. If no vertical line intersects the graph of the relation at more than one point, then the relation is a function.

30. no 31. yes 32. no

33. $y = 3$ maps each input value to a single output value namely 3, while $x = 3$ matches the input value 3 to infinitely many output values.

34.

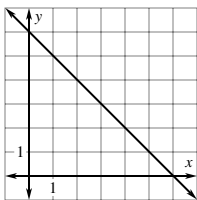
x	-2	-1	0	1	2
y	-5	-4	-3	-2	-1



Chapter 2 *continued*

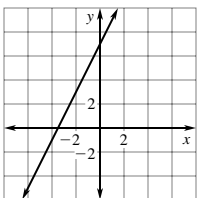
35.

x	-2	-1	0	1	2
y	8	7	6	5	4



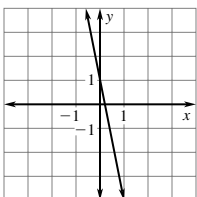
36.

x	-2	-1	0	1	2
y	3	5	7	9	11



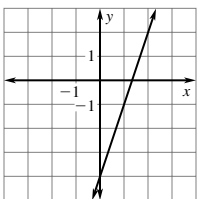
37.

x	-2	-1	0	1	2
y	11	6	1	-4	-9



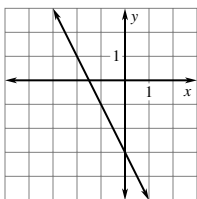
38.

x	-2	-1	0	1	2
y	-10	-7	-4	-1	2



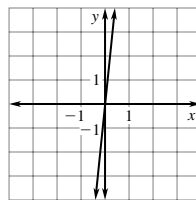
39.

x	-2	-1	0	1	2
y	1	-1	-3	-5	-7



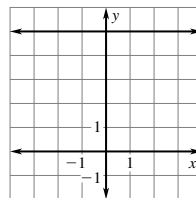
40.

x	-2	-1	0	1	2
y	-20	-10	0	10	20



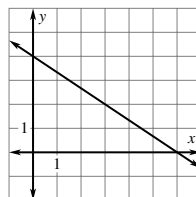
41.

x	-2	-1	0	1	2
y	5	5	5	5	5



42.

x	-2	-1	0	1	2
y	$\frac{16}{3}$	$\frac{14}{3}$	4	$\frac{10}{3}$	$\frac{8}{3}$



43. linear; $f(4) = 4 - 11 = -7$ 44. linear; $f(-4) = 2$

45. not linear; $f(-6) = |-6| - 5 = 1$

46. not linear; $f(2) = 9(2)^3 - (2)^2 + 2$
 $= 9(8) - 4 + 2 = 70$

47. not linear; $f(6) = -\frac{2}{3}(6)^2 - 6 + 5 = -\frac{2}{3}(36) - 1$
 $= -24 - 1 = -25$

48. linear; $f(-\frac{1}{2}) = -3 + 4(-\frac{1}{2}) = -3 - 2 = -5$

49. $V(5) = 5^3 = 125$; the volume of a cube with sides of length 5 units

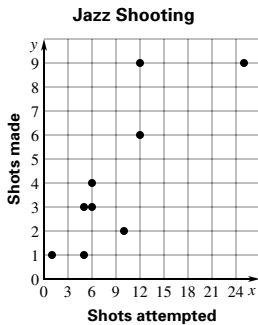
50. $V(2) = \frac{4}{3}\pi(2)^3 = \frac{32\pi}{3}$; the volume of a sphere with radius 2 units

51. No; *Sample answer:* Not every age corresponds to exactly one place. For example, there were 24-year-olds with finishes of first and third.

52. Yes; *Sample answer:* Each Congress number corresponds to one number of Independents.

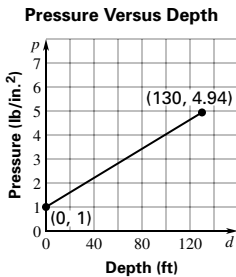
Chapter 2 continued

53. domain: 1, 5, 6, 10, 12, 25
range: 1, 2, 3, 4, 6, 9



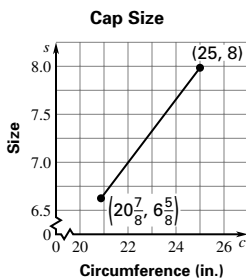
54. No; *Sample answer:* The input value 6 is mapped to 2 different output values, 3 and 4.
55. domain: $0 \leq d \leq 130$
range: $1 \leq p \leq 4\frac{31}{33}$

d	0	26	52	78	104	130
p	1	$\frac{59}{33}$	$\frac{85}{33}$	$\frac{111}{33}$	$\frac{137}{33}$	$\frac{163}{33}$



56. $p = \frac{1}{33}(100) + 1$
 $p = 4\frac{1}{33}$ atmospheres ≈ 59.2 lb/in.²
57. domain: $20\frac{7}{8} \leq c \leq 25$
range: $6\frac{5}{8} \leq s \leq 8$

c	$20\frac{7}{8}$	$21\frac{7}{10}$	$22\frac{21}{40}$	$23\frac{7}{20}$	$24\frac{7}{40}$	25
s	$6\frac{5}{8}$	$6\frac{9}{10}$	$7\frac{7}{40}$	$7\frac{9}{20}$	$7\frac{29}{40}$	8

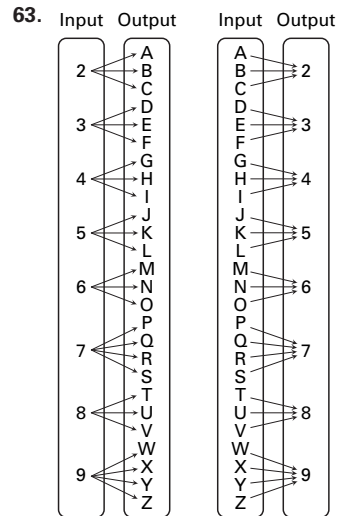


58. $7 = \frac{c-1}{3}$ 59. C 60. B 61. A 62. C

$$21 = c - 1$$

$$22 = c$$

22 in.



Letters to digits is a function, since each letter is mapped to a single digit. Digits to letters is not a function, since each digit corresponds to three or four different letters.

Mixed Review (p. 74)

64. $\frac{-2-6}{-3-9} = \frac{-8}{-12} = \frac{2}{3}$ 65. $\frac{5-11}{-4-2} = \frac{-6}{-6} = 1$

66. $\frac{5-(-5)}{2-3} = \frac{10}{-1} = -10$

67. $\frac{4-(-1)}{6-(-4)} = \frac{4+1}{6+4} = \frac{5}{10} = \frac{1}{2}$ 68. $\frac{4-3}{1-2} = \frac{1}{-1} = -1$

69. $\frac{10-8}{14-6} = \frac{2}{8} = \frac{1}{4}$

70. $2x + 13 = 31$ 71. $-2.4x + 11.8 = 29.8$
 $2x = 18$ $-2.4x = 18.0$
 $x = 9$ $x = -7.5$

72. $x + 17 = 10 - 3x$ 73. $\frac{5}{2} - 7x = 40 + x$
 $4x = -7$ $-8x = \frac{75}{2}$
 $x = -\frac{7}{4}$ $x = -\frac{75}{16} = -4\frac{11}{16}$

74. $-\frac{1}{3}(x-15) = -48$ 75. $6x + 5 = 0.5(x+6) - 4$
 $-\frac{1}{3}x + 5 = -48$ $6x = 0.5x + 3 - 4 - 5$
 $-\frac{1}{3}x = -53$ $5.5x = -6$
 $x = 159$ $x = -\frac{6}{5.5} = -1\frac{1}{11}$

Chapter 2 *continued*

76. $3x - 4 < 10$

$$3x < 14$$

$$x < \frac{14}{3}$$

no

78. $10 - x \geq 6$

$$-x \geq -4$$

$$x \leq 4$$

yes

80. $-5 \leq x + 8 < 15$

$$-13 \leq x < 7$$

yes

77. $\frac{1}{2}x - 8 \leq 0$

$$\frac{1}{2}x \leq 8$$

$$x \leq 16$$

yes

79. $3 + 2x > -5$

$$2x > -8$$

$$x > -4$$

yes

81. $x - 2.7 < -1$ or $3x > 6.9$

$$x < 1.7 \quad x > 2.3$$

yes

Lesson 2.2

2.2 Guided Practice (p. 79)

1. *Sample answer:* The slope is a measure of the rate of change of y with respect to x . The slope is positive if y increases as x increases, and is negative if y decreases as x increases. This corresponds to the definition of slope = (change in y)/(change in x).

2. horizontal; vertical

3. They are parallel if their slopes are equal; they are perpendicular if their slopes are negative reciprocals.

4. $m = \frac{3-2}{14-4} = \frac{1}{10}$; rises

5. $m = \frac{1-4}{8-8} = \frac{-3}{0}$; undefined; vertical

6. $m = \frac{-5-4}{3+3} = \frac{-9}{6} = -\frac{3}{2}$; falls

7. $m = \frac{8-4}{-6+2} = \frac{4}{-4} = -1$; falls

8. $m = \frac{3-3}{4+7} = \frac{0}{11} = 0$; horizontal

9. $m = \frac{-7-9}{-2-6} = \frac{-16}{-8} = 2$; rises

10. $m_1 = \frac{4-0}{3+5} = \frac{4}{8} = \frac{1}{2}$

$$m_2 = \frac{6-4}{1-0} = 2; \text{Line 2 is steeper.}$$

11. $m_1 = \frac{7-4}{1-2} = \frac{3}{-1} = -3$

$$m_2 = \frac{12-2}{3-5} = \frac{10}{-2} = -5; \text{Line 2 is steeper.}$$

12. $m_1 = \frac{-2-5}{-4-1} = \frac{-7}{-5} = \frac{7}{5}$

$$m_2 = \frac{-7-0}{-2-3} = \frac{-7}{-5} = \frac{7}{5}; \text{parallel}$$

13. $m_1 = \frac{7+2}{-2-2} = \frac{9}{-4}$

$$m_2 = \frac{1+5}{5-4} = \frac{6}{1} = 6; \text{neither}$$

14. $m_1 = \frac{-1-6}{2-3} = \frac{-7}{-1} = 7$

$$m_2 = \frac{1-2}{6+1} = \frac{-1}{7}; \text{perpendicular}$$

15. $m_1 = \frac{4-0}{3-9} = \frac{4}{-6} = -\frac{2}{3}$

$$m_2 = \frac{0-6}{4+5} = \frac{-6}{9} = -\frac{2}{3}; \text{parallel}$$

16. distance = 312 km

time = 6 hr

$$\text{rate} = \frac{\text{distance}}{\text{time}} = \frac{312 \text{ km}}{6 \text{ hr}} = 52 \text{ km/h}$$

2.2 Practice and Applications (p. 79–81)

17. Use points (1, 0) and (0, -1).

$$m = \frac{-1-0}{0-1} = \frac{-1}{-1} = 1$$

18. Use points (-3, 0) and (0, -1).

$$m = \frac{-1-0}{0+3} = \frac{-1}{3}$$

19. Use points (2, 1) and (2, -1).

$$m = \frac{-1-1}{2-2} = \frac{-2}{0}; \text{undefined}$$

20. $m = \frac{3-2}{-4-3} = \frac{1}{-7}$; falls

21. $m = \frac{6+4}{2-1} = \frac{10}{1} = 10$; rises

22. $m = \frac{11+3}{4-14} = \frac{14}{-10} = -\frac{7}{5}$; falls

23. $m = \frac{-6+12}{2+10} = \frac{6}{12} = \frac{1}{2}$; rises

24. $m = \frac{3-3}{-2+7} = \frac{0}{5} = 0$; horizontal

25. $m = \frac{6+6}{-6-6} = \frac{12}{-12} = -1$; falls

26. $m = \frac{1-2}{-18-4} = \frac{-1}{-22} = \frac{1}{22}$; rises

27. $m = \frac{2-8}{-9+9} = \frac{-6}{0}$; undefined; vertical

28. $m = \frac{-\frac{5}{4}-\frac{16}{4}}{2-3} = \frac{-\frac{21}{4}}{-1} = \frac{21}{4}$; rises

Chapter 2 continued

$$29. m = \frac{\frac{5}{2} - \frac{7}{2}}{2 - 0} = \frac{-\frac{2}{2}}{2} = -\frac{1}{2}; \text{ falls}$$

$$30. m = \frac{-2 + 1}{\frac{3}{5} - \frac{1}{5}} = \frac{-1}{\frac{2}{5}} = -\frac{5}{2}; \text{ falls}$$

$$31. m = \frac{-\frac{8}{3} + \frac{9}{3}}{\frac{4}{3} - \frac{4}{3}} = \frac{\frac{1}{3}}{0}; \text{ undefined; vertical}$$

32. *b* 33. *c* 34. *d* 35. *a*

36. If a line is horizontal, only the x values will be different; the y -values will remain the same.

$$\frac{y - y}{1 - 2} = \frac{0}{-1} = 0$$

If a line is vertical, only the y values will be different; the x -values will remain the same.

$$\frac{1 - 2}{x - x} = \frac{-1}{0}; \text{ undefined.}$$

$$37. m_1 = \frac{8 - 6}{2 + 2} = \frac{2}{4} = \frac{1}{2}$$

$$m_2 = \frac{-3 + 4}{5 - 0} = \frac{1}{5}; \text{ Line 1 is steeper.}$$

$$38. m_1 = \frac{6 - 1}{-8 - 4} = -\frac{5}{12}$$

$$m_2 = \frac{-8 - 4}{-1 + 2} = \frac{-12}{1} = -12; \text{ Line 2 is steeper.}$$

$$39. m_1 = \frac{-10 + 10}{2 - 3} = \frac{0}{-1} = 0$$

$$m_2 = \frac{12 - 8}{2 + 6} = \frac{4}{8} = \frac{1}{2}; \text{ Line 2 is steeper.}$$

$$40. m_1 = \frac{-9 - 6}{-2 + 5} = -\frac{15}{3} = -5$$

$$m_2 = \frac{1 - \frac{1}{2}}{\frac{5}{4} - \frac{4}{4}} = \frac{\frac{1}{2}}{\frac{1}{4}} = 2; \text{ Line 1 is steeper.}$$

$$41. m_1 = \frac{-6 - 9}{-6 + 1} = \frac{-15}{-5} = 3$$

$$m_2 = \frac{-2 + 23}{0 + 7} = \frac{21}{7} = 3; \text{ parallel}$$

$$42. m_1 = \frac{1 + 3}{-8 - 4} = \frac{4}{-12} = -\frac{1}{3}$$

$$m_2 = \frac{20 - 11}{8 - 5} = \frac{9}{3} = 3; \text{ perpendicular}$$

$$43. m_1 = \frac{-7 - 3}{0 - 0} = \frac{-10}{0}; \text{ undefined}$$

$$m_2 = \frac{-4 + 4}{12 + 6} = \frac{0}{18} = 0; \text{ perpendicular}$$

$$44. m_1 = \frac{15 - 10}{5 - 1} = \frac{5}{4}$$

$$m_2 = \frac{2 - \frac{3}{2}}{4 - \frac{3}{2}} = \frac{\frac{1}{2}}{\frac{5}{2}} = \frac{1}{5}; \text{ neither}$$

$$45. m = \frac{27 - 3}{8 - 4} = \frac{24}{4} = 6; \frac{\text{dollars}}{\text{h}}$$

$$46. m = \frac{17 - 5}{3 - 0} = \frac{12}{3} = 4; \frac{\text{m}}{\text{sec}}$$

$$47. m = \frac{16 - 10}{4 - 2} = \frac{6}{2} = 3; \frac{\text{in.}}{\text{year}}$$

$$48. m = \frac{3 - 0}{1000 - 0} = 0.003 \quad 49. m = \frac{55.9}{5.2} = 10.75$$

50. Yes; each slanted half of the roof rises 12 feet of its 36 feet of the apartment building's width, which gives it a slope of $\frac{12}{36} = \frac{1}{3}$, the same as the $\frac{4}{12}$ required by the building code.

51. $\frac{3100 \text{ ft}}{50,000 \text{ years}} = 0.062 \text{ ft/year}$; This is the ratio of the number of vertical feet the volcano must grow to the length of time it will take to grow that high.

$$52. \frac{81^\circ\text{F} - 47^\circ\text{F}}{1 - 6} = \frac{34^\circ\text{F}}{17 \text{ hr}} = \frac{2^\circ\text{F}}{\text{h}};$$

$$81^\circ - 8 \text{ hr} \left(\frac{2^\circ}{\text{hr}} \right) = 81^\circ - 16^\circ = 65^\circ\text{F}$$

53. No; no; the only possible difference is the ease of calculation with the same selections over others. Check lines and points. A good response will show calculations for at least 4 pairs of points.

54. a. 18 ft

$$b. \sqrt{(18)^2 + (1.5)^2} = \sqrt{324 + 2.25} = \sqrt{326.25} \approx 18.1 \text{ ft}$$

$$c. \sqrt{(30)^2 + \left(\frac{5}{3}\right)^2} \approx 30 \text{ ft}$$

d. *Sample answer:* The steeper the ramp, the shorter it will be. If regulation requires more run for the amount of rise, the ramp must get longer as it did from answers (b) to (c) above.

$$55. \frac{7 - k}{k - 5} = 1$$

$$k - 5 = 7 - k$$

$$2k = 12$$

$$k = 6$$

$$56. \frac{6 - 2k}{k + 3} = 4$$

$$4k + 12 = 6 - 2k$$

$$6k = -6$$

$$k = -1$$

$$57. \frac{4 - k}{k + 2} = 3$$

$$3k + 6 = 4 - k$$

$$4k = -2$$

$$k = -\frac{1}{2}$$

$$58. \frac{-1 + k}{3k - 9} = -\frac{1}{3}$$

$$-3k + 9 = -3 + 3k$$

$$-6k = -12$$

$$k = 2$$

2.2 Mixed Review (p. 81)

59. additive inverse property 60. associative property of addition 61. distributive property 62. multiplicative inverse property

Chapter 2 *continued*

63. $8x + y = 15$
 $y = 15 - 8x$
65. $\frac{8}{3}x + 2y = 16$
 $2y = 16 - \frac{8}{3}x$
 $y = 8 - \frac{4}{3}x$
67. $|9 + 2x| = 7$
 $9 + 2x = -7$ or $9 + 2x = 7$
 $2x = -16$ or $2x = -2$
 $x = -8$ or $x = -1$
68. $|4 - 6x| = 2$
 $4 - 6x = 2$ or $4 - 6x = -2$
 $-6x = -2$ or $-6x = -6$
 $x = \frac{1}{3}$ or $x = 1$
69. $|-3x + 1| = 4$
 $-3x + 1 = 4$ or $-3x + 1 = -4$
 $-3x = 3$ or $-3x = -5$
 $x = -1$ or $x = \frac{5}{3}$
70. $|0.25x - 9| = 6$
 $0.25x - 9 = 6$ or $0.25x - 9 = -6$
 $0.25x = 15$ or $0.25x = 3$
 $x = 60$ or $x = 12$
71. $\$5.82 = 9x + \1.75
 $\$4.07 = 9x$
 $\$0.45 \approx x$
 about $\$0.45/\text{oz}$

Lesson 2.3

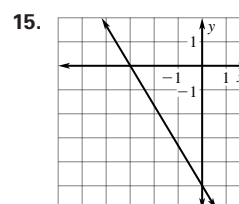
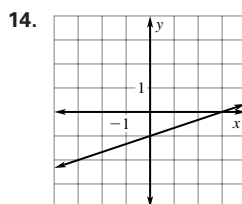
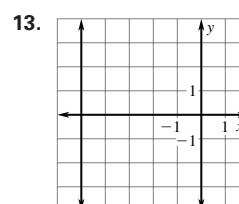
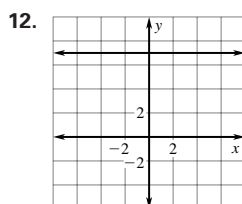
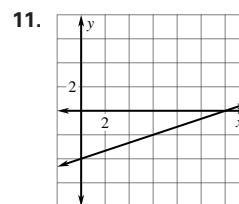
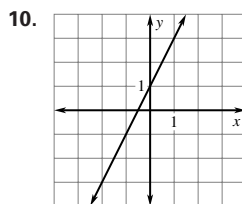
Developing Concepts Activity (p. 82)

Equation	Points on graph of equation	Slope	y-intercept
$y = 2x + 3$	(0, 3), (1, 5)	2	3
$y = -x + 2$	(0, 2), (1, 1)	-1	2
$y = \frac{1}{2}x - 4$	(0, -4), (1, -3 $\frac{1}{2}$)	$\frac{1}{2}$	-4
$y = -2x$	(0, 0), (1, -2)	-2	0
$y = 7$	(0, 7), (1, 7)	0	7

- The coefficient of x is the slope of its graph.
- The constant term of the equation is the y -intercept of its graph.

2.3 Guided Practice (p. 86)

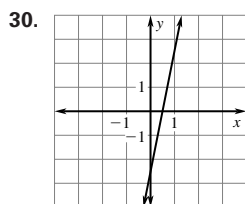
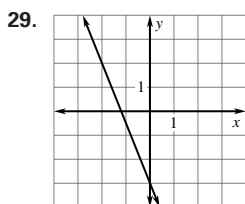
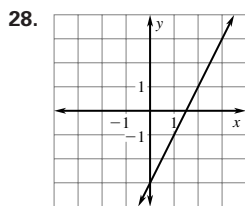
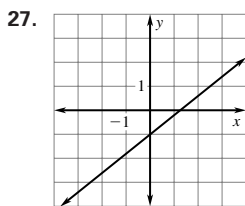
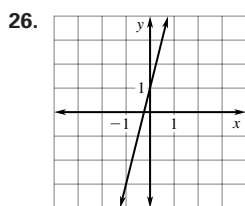
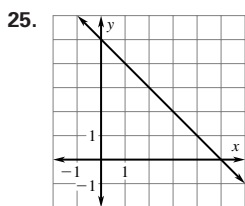
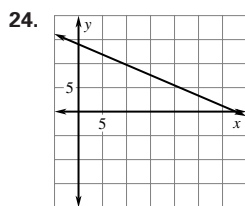
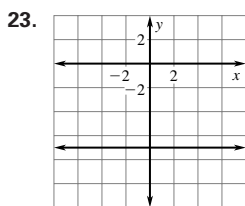
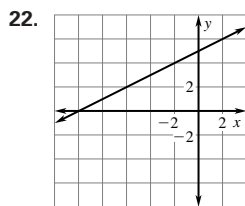
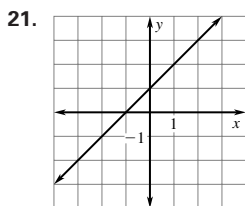
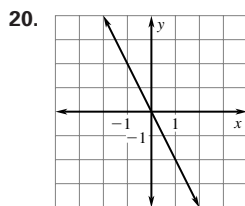
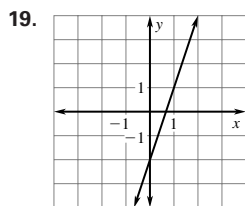
- The slope-intercept form of the equation is $y = mx + b$, where m is the slope and b is the y -intercept of the graph of the line. The standard form of the equation of a line is $Ax + By = C$.
- Slope-intercept technique; the equation is in slope-intercept form.
- Standard form technique; the equation is in standard form and the intercepts are easily found.
- $m = 1; b = 10$ $m = -2; b = -7$
- $2x - 3y = 18$ $\frac{2}{3}; -6$
 $-3y = 18 - 2x$
 $y = \frac{2}{3}x - 6$
- x -intercept = 11
 y -intercept = -11
- $5x = 20$ $-2y = 20$
 x -intercept = 4 y -intercept = -10
- x -intercept = 3
 y -intercept = -15



2.3 Practice and Applications (pp. 86-88)

16. B 17. A 18. C

Chapter 2 continued

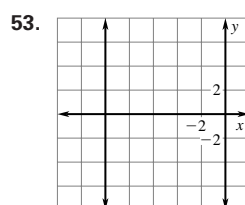
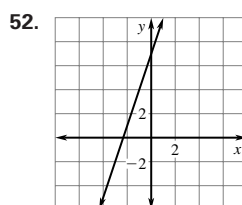
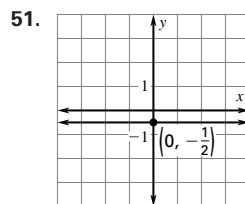
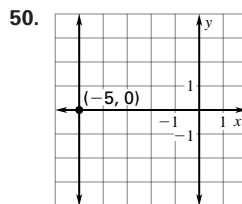
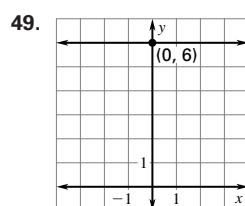
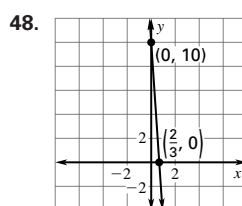
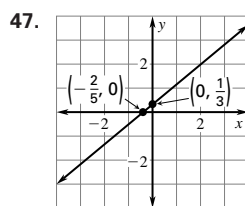
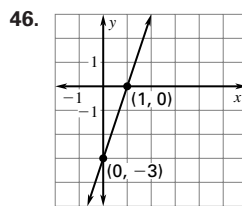
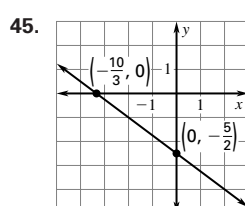
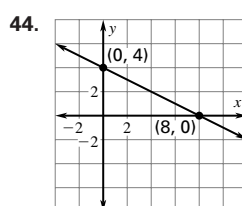
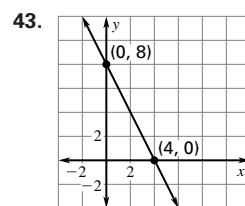
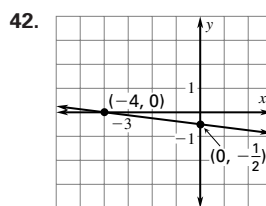
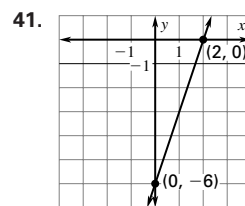
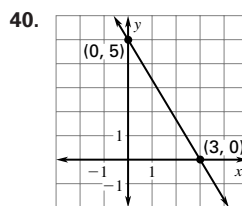


31. $m = 6; b = 10$ 32. $m = -9; b = 0$

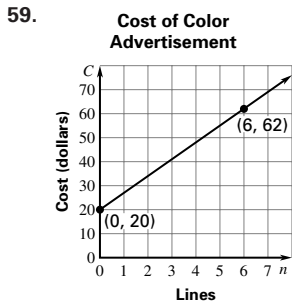
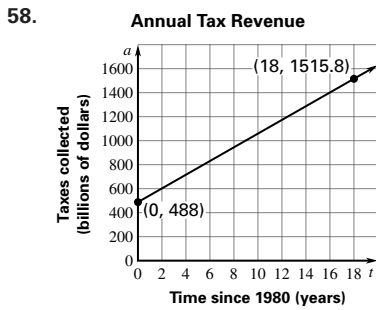
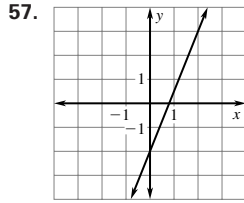
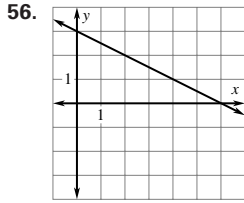
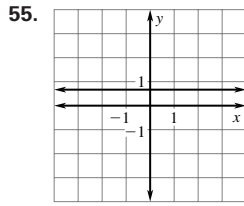
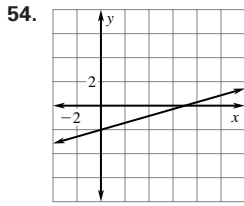
33. $m = 0; b = 100$ 34. $m = -2; b = 14$

35. $m = 4; b = -7$ 36. $m = -\frac{1}{10}; b = \frac{7}{10}$

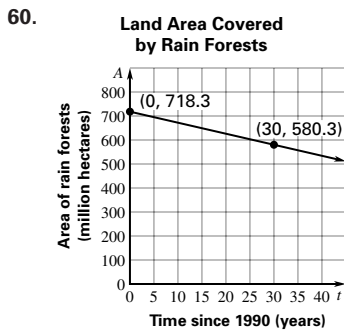
37. B 38. C 39. A



Chapter 2 *continued*

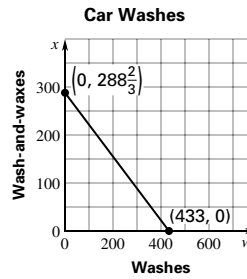


The slope, 7, represents the price of each line in the ad, while the C -intercept, 20, represents the initial cost of placing the colored ad.

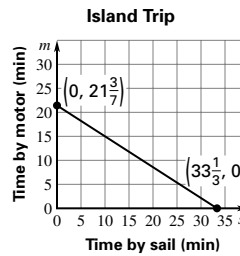


Sample answer: 672.3 million hectares in 2000; 557.3 million hectares in 2025; 442.3 million hectares in 2050

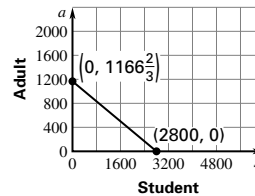
61. $8w + 12x = 3464$



62. $\frac{3}{20}s + \frac{7}{30}m = 5$



63. **Ticket Sales**



$2.5s + 6a = 7000$;
Sample answer: 1600 student tickets, 500 adult; 880 student, 800 adult; 400 student, 1000 adult.

64. To find the x -intercept, set y equal to zero in the equation, and solve for x . To find the y -intercept, set x equal to zero and solve for y . horizontal; vertical

65. B 66. B

67. $y_1 = 7x_1 + 6$

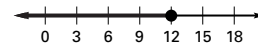
$y_2 = 7x_2 + 6$

$$\frac{(7x_2 + 6) - (7x_1 + 6)}{x_2 - x_1} = \frac{7x_2 - 7x_1}{x_2 - x_1} = \frac{7(x_2 - x_1)}{x_2 - x_1} = 7$$

2.3 Mixed Review (p. 88)

68. $9 + x \leq 21$

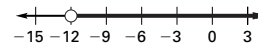
$x \leq 12$



69. $-\frac{2}{3}x + 3 < 11$

$-\frac{2}{3}x < 8$

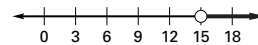
$x > -12$



70. $2x - 11 > 34 - x$

$3x > 45$

$x > 15$



71. $64 - 3x \geq 19 - 2x$

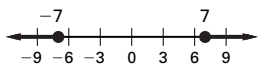
$45 \geq x$



Chapter 2 continued

72. $-5 < 2x - 0.5 \leq 23$
 $-4.5 < 2x \leq 23.5$
 $-2.25 < x \leq 11.75$

73. $x + 12 \leq 5$ or $3x - 21 \geq 0$
 $x \leq -7$ or $3x \geq 21$
 $x \geq 7$



74. $f(8) = \frac{1}{2}(8) - 13 = -9$

75. $f(5) = (5)^2 - 3(5) + 2 = 12$

76. $f(-7) = -(-7)^3 + 8(-7)^2 + 3 = 738$

77. $f(1) = 10 - 2(1) = 8$ 78. $f(-5) = |-5 + 17| = 12$

79. $f(\frac{1}{2}) = 12(\frac{1}{2})^2 - 19 = -16$ 80. $m = \frac{2 - 2}{7 - 3} = \frac{0}{4} = 0$

81. $m = \frac{9 + 3}{2 - 16} = \frac{12}{-14} = -\frac{6}{7}$ 82. $m = \frac{-8 + 9}{1 + 12} = \frac{1}{13}$

83. $m = \frac{-5 + 1}{-1 + 1} = \frac{-4}{0}$; undefined

84. $m = \frac{2 + 2}{-3 - 5} = \frac{4}{-8} = -\frac{1}{2}$

85. $m = \frac{-5 - 7}{2 + 4} = \frac{-12}{6} = -2$

86. $\frac{2 \text{ pages}}{1 \text{ minute}} \cdot \frac{60 \text{ minutes}}{1 \text{ hour}} = \frac{120 \text{ pages}}{1 \text{ hour}}$

Let T = the total number of pages read in h hours.

$$T = 120h$$

$$1048 = 120h$$

$$h = 8\frac{11}{15} = 8 \text{ hours } 44 \text{ minutes}$$

Quiz 1 (page 89)

1. domain: $-2, -1, 0, 1, 2$ 2. domain: $1, 2, 3, 4$
 range: $-2, 1$ range: $1, 2, 3, 4$
 function not a function

3. domain: $-3, -1, 0, 1, 2$
 range: $-3, -2, 0, 1$
 function

4. $f(4) = -2(4) - 13 = -21$

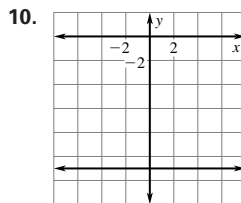
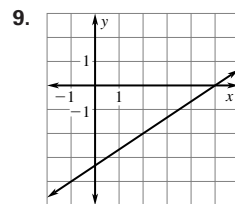
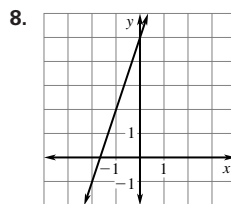
5. $f(-5) = 5(-5)^2 - (-5) + 9 = 139$

6. $m_1 = \frac{5 - 10}{1 - 2} = \frac{-5}{-1} = 5$ 7. $m_1 = \frac{2 - 5}{-9 - 4} = -\frac{3}{-13} = \frac{3}{13}$

$m_2 = \frac{-8 + 7}{8 - 3} = -\frac{1}{5}$ $m_2 = \frac{-1 + 6}{-2 - 6} = -\frac{5}{-8} = \frac{5}{8}$

perpendicular

neither



11. $\frac{468 \text{ mi}}{7 \times (5 \text{ P.M.} - 8 \text{ A.M.} - 1 \text{ h})} = \frac{468 \text{ mi}}{7 \times 8 \text{ h}} = \frac{468 \text{ mi}}{56 \text{ h}} \approx 8.36 \text{ mi/h}$

Math and History (p. 89)

1. $3 \text{ day} + 9\frac{2}{3} \text{ h} = 72 + 9\frac{2}{3} = 81\frac{2}{3} \text{ h}$

2. $\frac{2100}{81\frac{2}{3} \text{ h}} \approx 25.7 \text{ mi/h}$

3. $d = 3400 - 25.7t$

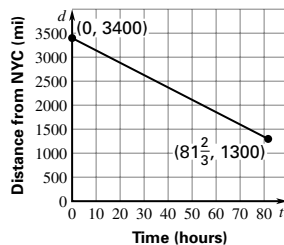
d = distance in miles

t = time in hours

domain: $0 \leq t \leq 81.7$

range: $1300 \leq d \leq 3400$

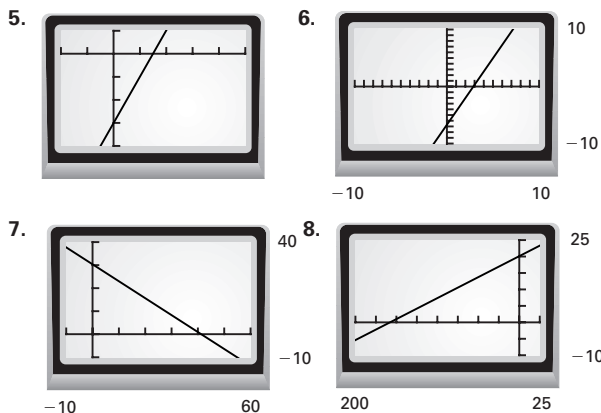
4. Titanic Voyage



Technology Activity 2.3 (p. 90)

- 1.
- 2.
- 3.
- 4.

Chapter 2 continued



Lesson 2.4

2.4 Guided Practice (p. 95)

- The constant of variation is the common value of $\frac{y}{x}$ when x and y show direct variation.
 - Given the slope, m , and the y -intercept, b , use the equation $y = mx + b$. Given the slope, m , and a point on the line, (x_1, y_1) , use the equation $y - y_1 = m(x - x_1)$. Given two points on the line, use the points to find the slope of the line and then use the slope and one of the points to find the equation, as above.
 - Sample answer:* the cost of a bag of apples and the weight of the fruit in the bag
4. $y = \frac{2}{5}x + 2$ 5. $y + 4 = 2(x - 0)$
 $y = 2x - 4$
6. $y - 2 = -3(x - 5)$ 7. $y - 0 = -\frac{3}{4}(x + 7)$
 $y = -3x + 17$ $y = -\frac{3}{4}x - \frac{21}{4}$
8. $m = \frac{8 - 2}{4 - 1} = \frac{6}{3} = 2$ 9. $m = \frac{0 - 2}{-5 - 0} = \frac{2}{5}$
 $y - 8 = 2(x - 4)$ $y - 0 = \frac{2}{5}(x + 5)$
 $y = 2x$ $y = \frac{2}{5}x + 2$
10. $m_1 = 3$, perpendicular $m_2 = -\frac{1}{3}$
 $y + 6 = -\frac{1}{3}(x - 1)$
 $y = -\frac{1}{3}x - \frac{17}{3}$
11. $m = 5$ 12. $c = 1.25p$
 $y - 9 = 5(x - 3)$ $c = 1.25(5)$
 $y = 5x - 6$ $c = 6.25$ million cassettes

2.4 Practice and Applications (pp. 95–98)

13. $y = 5x - 3$ 14. $y = -3x - 4$ 15. $y = -4x$
 16. $y = 4$ 17. $y = \frac{3}{5}x + 6$ 18. $y = -\frac{3}{4}x + \frac{7}{3}$

19. $y - 4 = 2(x - 0)$ 20. $y - 0 = 3(x - 1)$
 $y = 2x + 4$ $y = 3x - 3$
21. $y - 5 = 0(x + 6)$ 22. $y - 3 = -\frac{2}{3}(x - 9)$
 $y = 5$ $y - 3 = -\frac{2}{3}x + 6$
 $y = -\frac{2}{3}x + 9$
23. $y + 2 = -\frac{4}{3}(x - 3)$ 24. $y + 4 = \frac{2}{5}(x - 7)$
 $y + 2 = -\frac{4}{3}x + 4$ $y + 4 = \frac{2}{5}x - \frac{14}{5}$
 $y = -\frac{4}{3}x + 2$ $y = \frac{2}{5}x - \frac{34}{5}$
25. $m = 2$ 26. $m_1 = \frac{-4 + 6}{3 - 4} = \frac{2}{-1} = -2$
 $y + 1 = 2(x - 1)$ $m_2 = \frac{1}{2}$
 $y = 2x - 3$ $y + 10 = \frac{1}{2}(x - 6)$
 $y + 10 = \frac{1}{2}x - 3$
 $y = \frac{1}{2}x - 13$
27. The slope needs to be undefined which means the line is horizontal; therefore $x = 2$.
28. $m_1 = \frac{4 + 6}{-10 - 6} = \frac{2}{4} = \frac{1}{2}$ 29. $y - 1 = \frac{1 + 2}{1 + 1}(x - 1)$
 $y - 6 = \frac{1}{2}(x - 4)$ $y - 1 = \frac{3}{2}(x - 1)$
 $y = \frac{1}{2}x + 4$ $y = \frac{3}{2}x - \frac{1}{2}$
30. $y - 8 = \frac{8 - 4}{-4 + 6}(x + 4)$
 $y - 8 = \frac{4}{2}(x + 4)$
 $y = 2x + 16$
31. $y + 5 = \frac{-15 + 5}{15 + 5}(x + 5)$
 $y + 5 = -\frac{10}{20}(x + 5)$
 $y + 5 = -\frac{1}{2}(x + 5)$
 $y = -\frac{1}{2}x - \frac{15}{2}$
32. $y + 6 = \frac{-6 + 18}{-9 + 12}(x + 9)$ 33. $y - 6 = \frac{6 - 2}{2 - 6}(x - 2)$
 $y + 6 = \frac{12}{3}(x + 9)$ $y - 6 = -1(x - 2)$
 $y + 6 = 4x + 36$ $y = -x + 8$
 $y = 4x + 30$

Chapter 2 continued

$$34. y - 0 = \frac{0 - 3}{0 + 1}(x - 0) \quad 35. y - 5 = \frac{5 - 14}{8 - 11}(x - 8)$$

$$y = -3x \quad y - 5 = \frac{-9}{-3}(x - 8)$$

$$y - 5 = 3x - 24$$

$$y = 3x - 19$$

$$36. y - 9 = \frac{9 - 7}{-5 + 4}(x + 5) \quad 37. y - 1 = \frac{1 - 8}{0 + 8}(x - 0)$$

$$y - 9 = -2(x + 5) \quad y - 1 = -\frac{7}{8}x$$

$$y - 9 = -2x - 10 \quad y = -\frac{7}{8}x + 1$$

$$y = -2x - 1$$

$$38. y - 0 = \frac{6 - 0}{-4 - 2}(x - 2)$$

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

$$y = -3x + 6$$

$$39. y - 15 = \frac{15 + 10}{5 + 20}(x - 5) \quad 40. y - 0 = \frac{0 - 6}{-2 - 0}(x + 2)$$

$$y - 15 = x - 5 \quad y = 3(x + 2)$$

$$y = x + 10 \quad y = 3x + 6$$

$$41. 3 = \left(-\frac{1}{2}\right)(2) + b$$

$$3 = -1 + b$$

$$b = 4$$

The equation is $y = -\frac{1}{2}x + 4$, the same as in Example 2. The slope-intercept equation of a line is unique.

$$42. y - 4 = 1(x - 3)$$

$$m = \frac{-1 - 4}{-2 - 3} = \frac{-5}{-5} = 1$$

$$y = x + 1$$

This is the same equation as in Example 4, since the slope-intercept equation of a line is unique.

$$43. y = \frac{7}{2}x \quad 44. y = -\frac{5}{2}x$$

$$y = \frac{7}{2}(8) = 28 \quad y = -\frac{5}{2}(8) = -20$$

$$45. y = -3x \quad 46. y = \frac{1}{6}x$$

$$y = -3(8) = -24 \quad y = \frac{1}{6}(8) = \frac{4}{3}$$

$$47. y = \frac{1}{2}x \quad 48. y = 2x$$

$$y = \frac{1}{2}(8) = 4 \quad y = 2(8) = 16$$

$$49. y = \frac{1}{2}x \quad 50. y = \frac{5}{3}x$$

$$-5 = \frac{1}{2}x \quad -5 = \frac{5}{3}x$$

$$-10 = x \quad -3 = x$$

$$51. y = \frac{1}{5}x \quad 52. y = \frac{1}{50}x$$

$$-5 = \frac{1}{5}x \quad -5 = \frac{1}{50}x$$

$$-25 = x \quad -250 = x$$

$$53. y = \frac{1}{2}x$$

$$-5 = \frac{1}{2}x$$

$$-10 = x$$

$$55. \text{yes; } y = \frac{1}{2}x$$

$$57. \text{yes; } y = -x$$

$$59. P = 60,300t + 2,842,200$$

$$P = 60,300(24) + 2,842,200$$

$$P = 4,289,400$$

$$60. a = 0.138(t - 386) + 201$$

$$a = 0.138(2243) + 201$$

$$a \approx \$510.53$$

$$62. V = \frac{5}{9}C + 333$$

$$V = \frac{5}{9}(60) + 333$$

$$V = \frac{100}{3} + 333$$

$$V = 366\frac{1}{3} \text{ m/sec}$$

$$64. C = 3.65t$$

$$438 = 3.65t$$

$$120 \text{ min} = t$$

$$2 \text{ h} = t$$

$$66. A = 3w$$

$$A = 3(7.5 \text{ in.})$$

$$A = 22.5 \text{ in.}^2$$

$$54. y = -\frac{22}{3}x$$

$$-5 = -\frac{22}{3}x$$

$$\frac{15}{22} = x$$

$$56. \text{no}$$

$$58. \text{yes; } y = -2x$$

$$61. s = 0.629t + 7.4$$

$$s = 0.629(22) + 7.4$$

$$s \approx \$21.2 \text{ billion}$$

$$63. h = \frac{1}{7}l$$

$$(5.5) = \frac{1}{7}l$$

$$38.5 \text{ ft} = l$$

$$65. r = \frac{1}{240}t$$

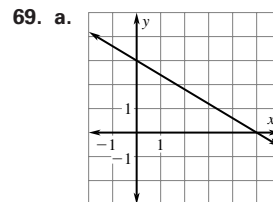
$$2.75 \text{ in.} = \frac{1 \text{ in.}}{240 \text{ sec}}t$$

$$660 \text{ sec} = t$$

$$11 \text{ min} = t$$

$$67. \text{no}$$

$$68. \text{no}$$



c. a is the x -intercept,
 b is the y -intercept.

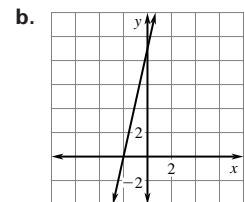
$$e. \frac{x}{-5} + \frac{y}{-8} = 1$$

$$70. m = \frac{y - b}{x - 0}$$

$$m = \frac{y - b}{x}$$

$$mx = y - b$$

$$y = mx + b$$



$$d. \frac{x}{3} + \frac{y}{4} = 1$$

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

Chapter 2 continued

2.4 Mixed Review (p. 98)

71. $|x - 10| = 17$

$$x - 10 = -17 \text{ or } x - 10 = 17$$

$$x = -7 \text{ or } x = 27$$

72. $|7 - 2x| = 5$

$$7 - 2x = -5 \text{ or } 7 - 2x = 5$$

$$-2x = -12 \text{ or } -2x = -2$$

$$x = 6 \text{ or } x = 1$$

73. $|-x - 9| = 1$

$$-x - 9 = -1 \text{ or } -x - 9 = 1$$

$$-x = 8 \text{ or } -x = 10$$

$$x = -8 \text{ or } x = -10$$

74. $|4x + 1| = 0.5$

$$4x + 1 = -0.5 \text{ or } 4x + 1 = 0.5$$

$$4x = -1.5 \text{ or } 4x = -\frac{1}{2}$$

$$x = -\frac{3}{8} \text{ or } x = -\frac{1}{8}$$

75. $|22x + 6| = 9.2$

$$22x + 6 = -9.2 \text{ or } 22x + 6 = 9.2$$

$$22x = -15\frac{1}{5} \text{ or } 22x = 3\frac{1}{5}$$

$$x = -\frac{38}{55} \text{ or } x = \frac{8}{55}$$

76. $|5.2x + 7| = 3.8$

$$5.2x + 7 = -3.8 \text{ or } 5.2x + 7 = 3.8$$

$$5.2x = -10\frac{4}{5} \text{ or } 5.2x = -\frac{16}{5}$$

$$x = -\frac{27}{13} \approx -2.08 \text{ or } x = -\frac{8}{13} \approx -0.615$$

77. $m = \frac{7 + 7}{2 - 1} = \frac{14}{1} = 14$ 78. $m = \frac{-4 + 1}{-5 + 1} = \frac{-3}{-4} = \frac{3}{4}$

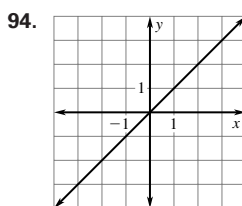
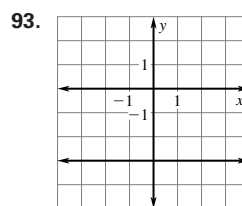
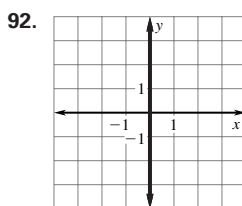
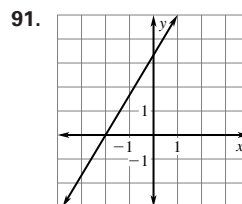
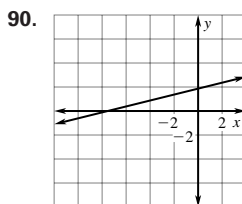
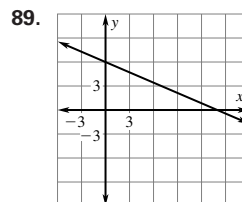
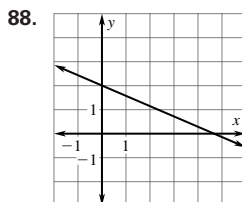
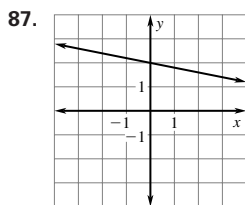
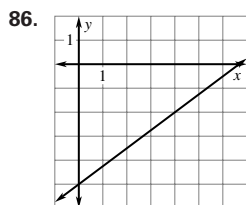
79. $m = \frac{10 - 4}{5 - 2} = \frac{6}{3} = 2$ 80. $m = \frac{-1 + 2}{-3 - 5} = -\frac{1}{8}$

81. $m = \frac{4 - 4}{2 + 2} = \frac{0}{4} = 0$ 82. $m = \frac{4 + 1}{-5 + 4} = \frac{3}{-9} = -\frac{1}{3}$

83. $m = \frac{10 + 8}{-9 + 0} = \frac{18}{-9} = -2$

84. $m = \frac{5 - 11}{-6 - 6} = -\frac{17}{0}$; undefined

85. $m = \frac{11 - 4}{-4 + 11} = \frac{7}{7} = 1$



Developing Concepts Activity 2.5 (p. 99)

Good responses to the 4 steps and 6 exercises should include all of these:

- a complete table with 10 different data points
- an accurate scatter plot of the data
- a reasonable guess of the best-fitting line
- correct calculation of slope and y-intercept, with a correct equation
- correct use of model to predict y for $x = 300$ cm
- an actual measurement to check prediction

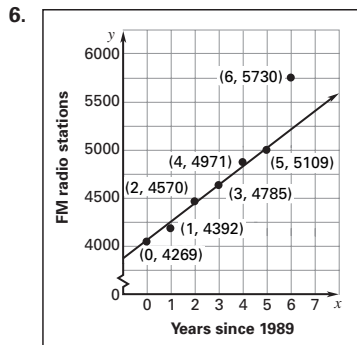
Lesson 2.5

2.5 Guided Practice (p. 103)

1. Positive correlation occurs if y -tends to increase as x -increases. A negative correlation occurs if y tends to decrease as x increases. Relatively no correlation occurs if the points show no linear pattern.
2. *Sample answer:* A positive correlation; taller men tend to have larger feet.
3. *Sample answer:* Two data points lie on the line and all the rest are above the line. There should be about as many data points below the line as there are above.

Chapter 2 continued

4. A positive correlation; the y -values tend to increase as the x -values increase.
5. $y = 0.25(4) + 0.375$
 $y = 1.375$ m



Sample answer:

Points (2, 4570) and (4, 4971)

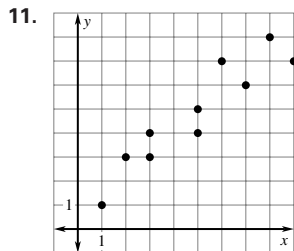
$$y - 4971 = \frac{4971 - 4570}{4 - 2}(x - 4)$$

$$y = 200.5x + 4169$$

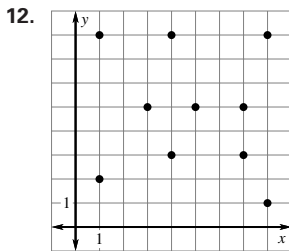
7. $y = 200.5(21) + 4169$
 $y = 8379.5$
 about 8380 stations

2.5 Practice and Applications (pp. 103–105)

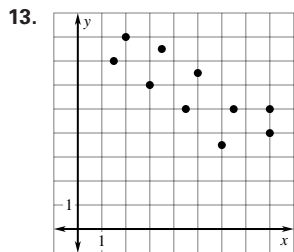
8. negative correlation 9. positive correlation
10. relatively no correlation



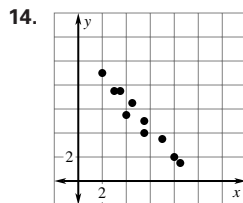
positive correlation



relatively no correlation



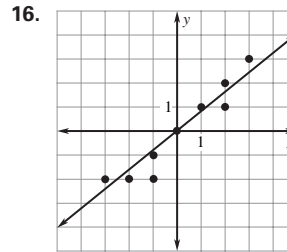
negative correlation



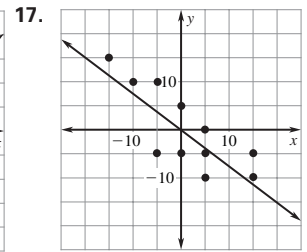
negative correlation

15. *Sample answer:* List the data points so that the values of x are in increasing order. If the y -values mostly increase along with the x -values, there is a positive correlation. If the y -values decrease as the x -values increase, there is a negative correlation. Otherwise, there is relatively no correlation.

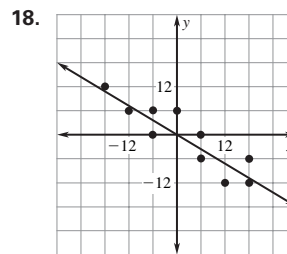
16–21 Sample answers are given.



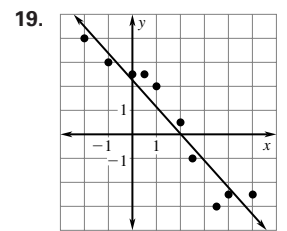
$$y = 0.88x - 0.1$$



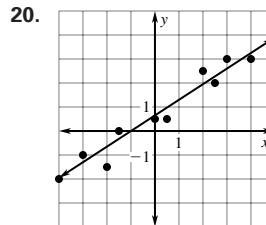
$$y = -0.86x - 0.05$$



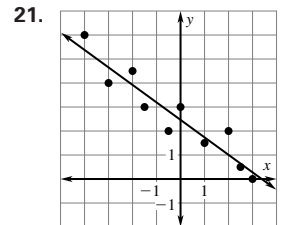
$$y = -0.65x + 0.13$$



$$y = -1.11x + 2.27$$

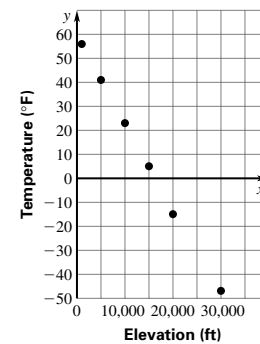


$$y = 0.66x + 0.6$$



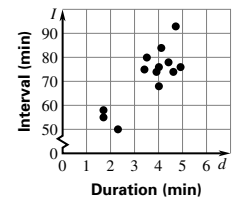
$$y = -0.73x + 2.47$$

22. High Altitude Temperatures



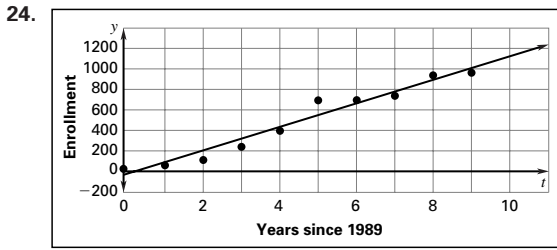
negative correlation

23. Old Faithful Eruptions



positive correlation

Chapter 2 continued

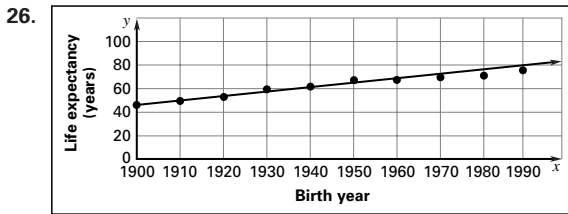


$$y = 110t - 22$$

25. $y = 110(21) - 22$

$$y = 2288$$

about 2290 people



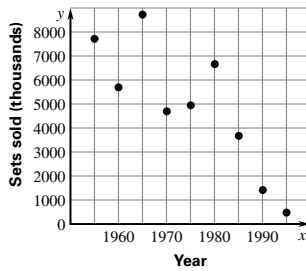
$$y = 0.325x - 571$$

27. $y = 0.33(2010) - 571$

$$y = 92.3$$

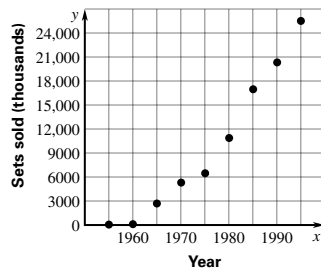
about 92 years

28. a. **Black-and-White TV Sales**



negative correlation

b. **Color TV Sales**



positive correlation

c. Negatively correlated; as sales of color TVs increased, the sales of black-and-white TVs decreased.

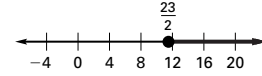
29. *Sample answer:* One possibility would be the way the price of a gallon of gas varies over time, since the fluctuations in the price are so erratic and cannot be predicted. Another possibility would be the sales of some new technology that showed up on the scene and then died out very quickly when it was replaced by something else.

2.5 Mixed Review (p. 106)

30. $2x - 9 \geq 14$

$$2x \geq 23$$

$$x \geq \frac{23}{2}$$

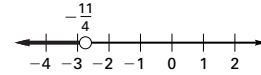


31. $3(x + 7) < -x + 10$

$$3x + 21 < -x + 10$$

$$4x < -11$$

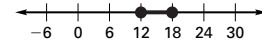
$$x < -\frac{11}{4}$$



32. $17 \leq 2x - 7 \leq 29$

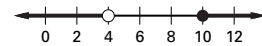
$$24 \leq 2x \leq 36$$

$$12 \leq x \leq 18$$



33. $x - 4 < 0$ or $x - 6 \geq 4$

$$x < 4 \text{ or } x \geq 10$$



34. $m_1 = \frac{6 - 4}{1 + 3} = \frac{2}{4} = \frac{1}{2}$

$$m_2 = \frac{2 + 5}{6 - 1} = \frac{7}{5};$$

Line 2 is steeper.

35. $m_1 = \frac{4 - 1}{-4 - 6} = -\frac{3}{10}$

$$m_2 = \frac{-6 - 3}{1 + 2} = -\frac{9}{3} = -3;$$

Line 2 is steeper.

36. $m_1 = \frac{4 - 7}{2 - 1} = -3$

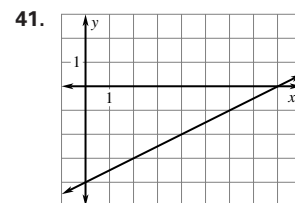
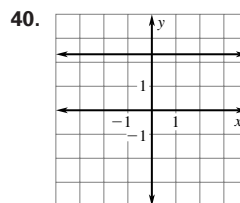
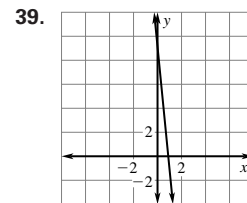
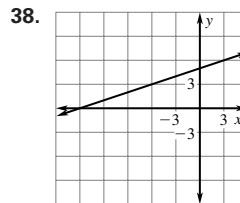
$$m_2 = \frac{8 - 8}{3 + 5} = \frac{0}{8};$$

Line 1 is steeper.

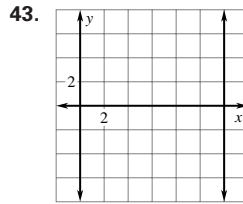
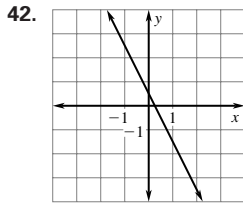
37. $m_1 = \frac{-9 - 3}{1 - 4} = \frac{-12}{-3} = 4$

$$m_2 = \frac{-7 + 4}{3 + 2} = -\frac{3}{5};$$

Line 1 is steeper.



Chapter 2 continued



Quiz 2 (p. 106)

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

2. $y + 3 = 2(x + 4)$
 $y + 3 = 2x + 8$
 $y = 2x + 5$

3. $y + 7 = -\frac{1}{5}(x - 2)$
 $y + 7 = -\frac{1}{5}x + \frac{2}{5}$
 $y = -\frac{1}{5}x - \frac{33}{5}$

4. $m_1 = \frac{4 - 2}{0 - 4} = \frac{2}{-4} = -\frac{1}{2}$
 $m_2 = 2$
 $y + 2 = 2(x - 1)$
 $y + 2 = 2x - 2$
 $y = 2x - 4$

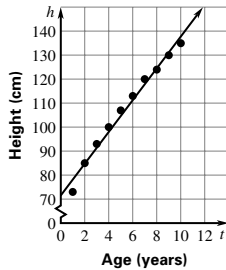
5. relatively no correlation 6. negative correlation

7. positive correlation 8. $d = 1.3h$

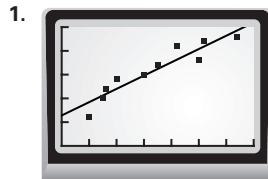
$5.2 = 1.3h$

$4 \text{ ft} = h$

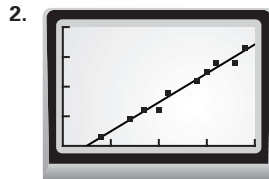
9. **Heights of Children** $h = 6.63t + 71.5$



Technology Activity 2.5 (page 107)



$y = 0.0028x + 0.32$

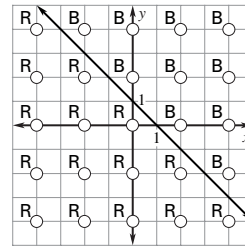


$y = 97.8x - 247.8$

Lesson 2.6

Activity (p. 108)

1. and 2.



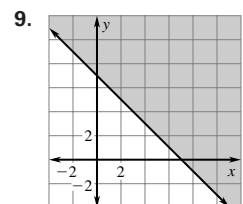
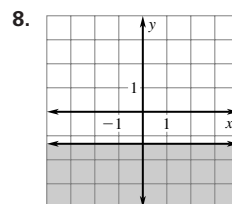
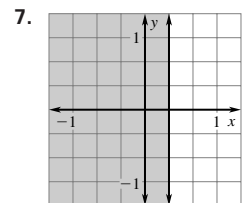
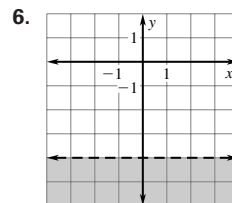
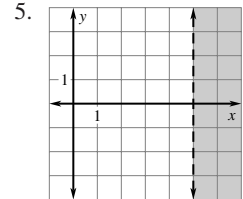
3. The blue dots lie on or above the line; the red dots are below the line.

4. *Sample answer:* Graph the related line, solid if the inequality is \leq or \geq ; dashed if the inequality is $<$ or $>$. Test a point not on the line to see if it is a solution of the inequality and find out which region of the plane to shade.

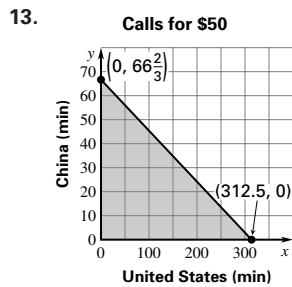
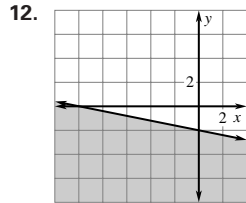
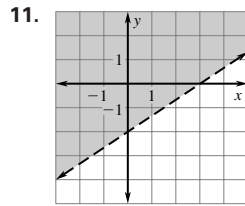
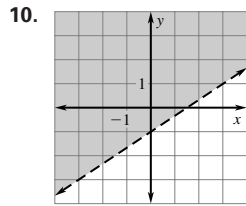
2.6 Guided Practice (p. 111)

- Sample answer:* The graph of a linear equation is a line in the plane, while the graph of a linear inequality is a half-plane with a line as its boundary.
- Dashed; solid; *Sample answer:* The points for which $Ax + By = C$ are solutions of the latter inequality and are included as part of the graph by using a solid line, but are not solutions of $Ax + By < C$.
- False; $(3)(\frac{4}{3}) - 0 = 4$, so $(\frac{4}{3}, 0)$ is not a solution of the inequality.

4. True; for points (x, y) on the line, $y = 3x + 5$. For points (x, y) below the line, the inequality is satisfied, since the y values are smaller.



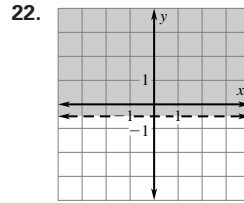
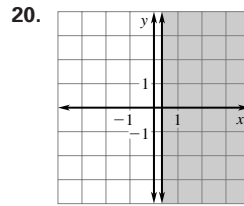
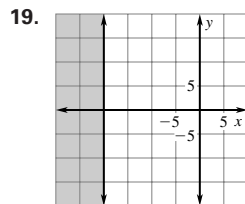
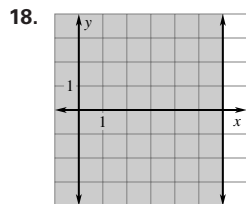
Chapter 2 *continued*



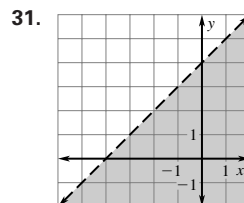
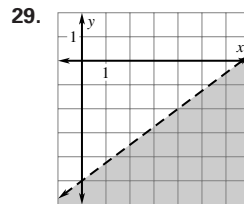
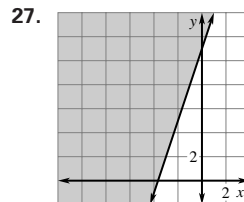
One possible solution is to spend 50 minutes on calls to China and 78 minutes on calls in the United States, for a total cost of \$49.98. Another solution would be to spend 50 minutes on calls within the United States and 56 minutes on calls to China; this uses exactly \$50. A third solution is 100 minutes on calls within the United States and 45 minutes on calls to China. This solution uses a total of \$49.75.

2.6 Practice and Applications (p. 111)

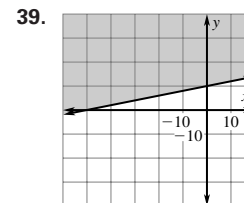
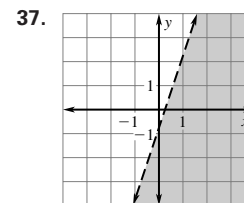
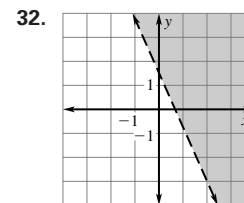
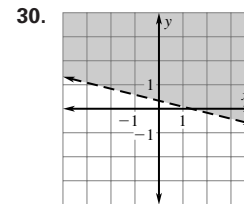
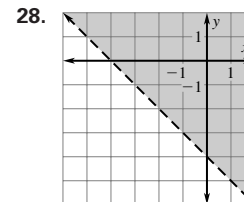
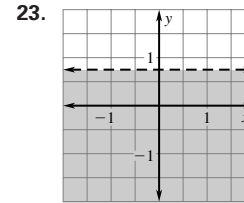
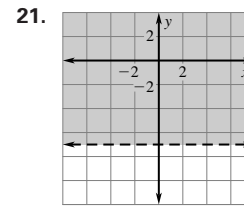
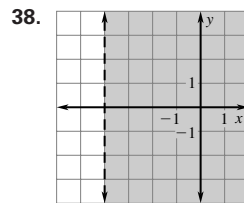
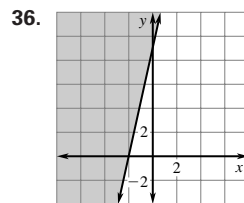
14. $0 \leq -5$ no 15. $2(-6) \geq 7$ no
 $-5 \leq -5$ yes $2(4) \geq 7$ yes
16. $2 < -9(-2) + 7$ yes 17. $19(2) + (3) \geq -0.5$ yes
 $-8 < -9(3) + 7$ no $19(-1) + (0) \geq -0.5$ no



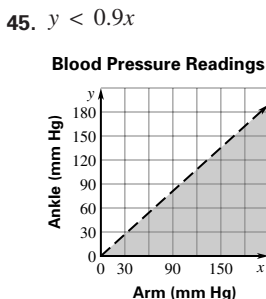
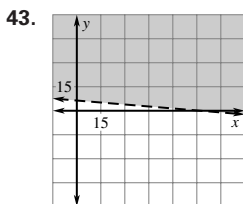
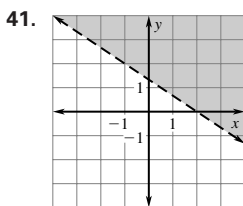
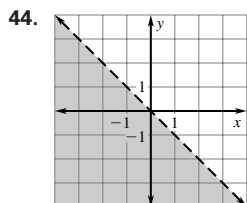
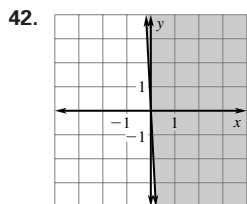
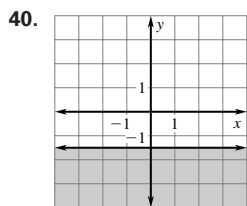
24. B 25. C 26. A



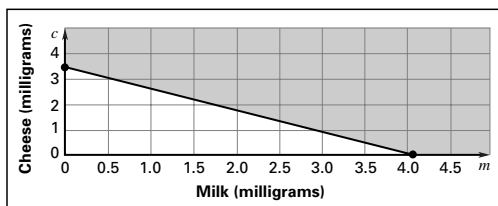
33. C 34. A 35. B



Chapter 2 continued



46. $296m + 338c \geq 1200$

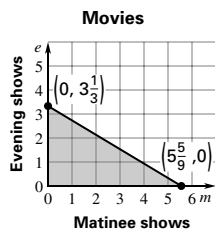


47. $296m + 338(2) \geq 1200$

$$296m \geq 524$$

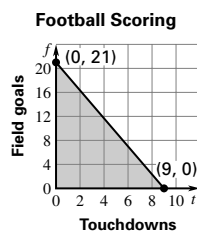
$$m \geq 1.77 \text{ cups}$$

48. $4.5m + 7.5e \leq 25$



49. *Sample answer:* You can attend 5 matinees and no evening showings for a total of \$22.50, 2 of each for a total cost of \$24 or 3 evening showings at a cost of \$22.50.

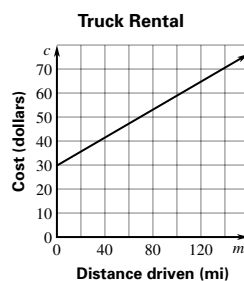
50. $7t + 3f \leq 63$



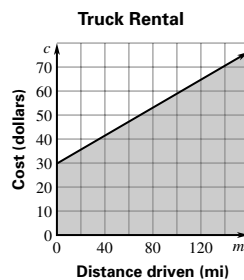
51. *Sample answer:*

- 9 touchdowns and no field goals for 63 points;
- 5 touchdowns and 1 field goal for 38 points;
- 2 touchdowns and 3 field goals for 23 points;
- 4 touchdowns and 11 field goals for 61 points;
- 6 touchdowns and 1 field goal for 45 points.

52. a. $c = 29.99 + 0.29m$



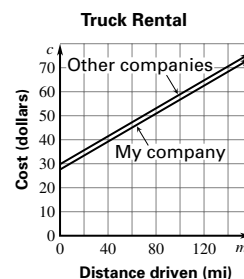
b. $c = 29.99 + 0.29m$



c. *Sample answer:* If I charge a lower flat rate and not the per mile charge, I will always be lower in price than my competitors with the same mile rate.

d. *Sample answer:*

$$c = 27.77 + 0.29m$$



e. *Sample answer:* If I raise my flat rate my total cost would be more expensive until both cars have gone a distance that would make my total cost lower.

53. $4x + 9y \leq 36$

Chapter 2 continued

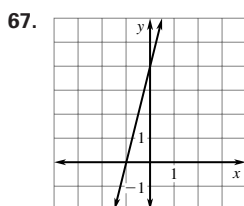
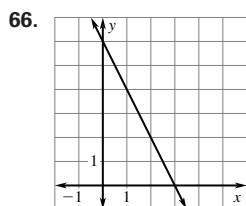
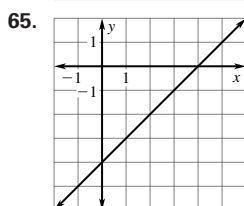
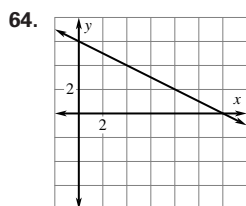
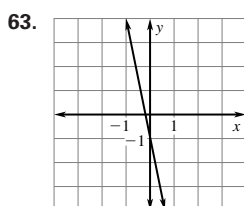
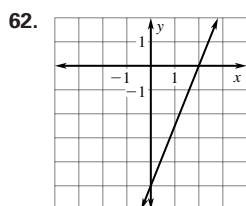
54. *Sample answer:* I used the x and y intercepts to find two points on the line. From there I used the point-slope formula to find the equation of the line. Since the line is drawn in full and the area shaded is less than 36, the equation is written $4x + 9y \leq 36$.

55. *Sample answer:* x is the number of grams of carbohydrates and protein and y is the number of grams of fat in a food that has 56 or fewer cal., or if x is the number of minutes spent walking at 4 mi/h and y is the number of minutes spent riding a bike at 9 mi/h, then $4x + 9y \leq 36$ represents those combinations of (x, y) that correspond to 36 or fewer miles.

2.6 Mixed Review (p. 113)

56. 1.0×10^7 57. 1.65×10^9 58. 2.03×10^5

59. 6.7×10^{-4} 60. 9×10^{-7} 61. 8.08×10^{-2}



68. $y - 2 = \frac{2 - 5}{2 - 5}(x - 2)$

69. $y - 7 = \frac{7 - 1}{0 - 5}(x - 0)$

$y - 2 = x - 2$

$y - 7 = -\frac{6}{5}x$

$y = x$

$y = -\frac{6}{5}x + 7$

70. $y - 6 = \frac{6 + 2}{-1 - 8}(x + 1)$

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

$y - 6 = -\frac{8}{9}(x + 1)$

$x = 3$

$y = -\frac{8}{9}x + \frac{46}{9}$

72. $y - 9 = \frac{9 + 6}{1 + 10}(x - 1)$

73. $y + 8 = \frac{-8 + 8}{-7 - 4}(x - 4)$

$y - 9 = \frac{15}{11}(x - 1)$

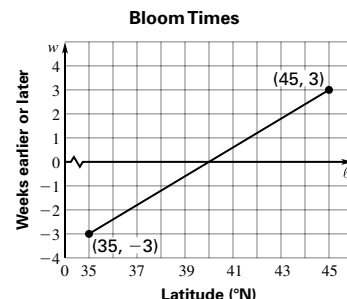
$y + 8 = 0$

$y = \frac{15}{11}x + \frac{84}{11}$

$y = -8$

74. domain: $35 \leq l \leq 45$

range: $-3 \leq w \leq 3$



Lesson 2.7

2.7 Guided Practice (p. 117)

1. Piecewise functions are represented by a combination of equations. Step functions have a graphic representation that looks like a set of steps;

Piecewise:

$$f(x) = \begin{cases} 2x - 1, & \text{if } x \leq 1 \\ 3x + 1, & \text{if } x > 1 \end{cases}$$

Step function:

$$f(x) = \begin{cases} 1, & \text{if } 0 \leq x < 1 \\ 2, & \text{if } 1 \leq x < 2 \\ 3, & \text{if } 2 \leq x < 3 \\ 4, & \text{if } 3 \leq x < 4 \end{cases}$$

2. The point is included; the point is not included.

3. False; *Sample answer:* The separate pieces are graphs of different functions. The graphs don't have to be connected. For example, a step function is a piecewise function, but the steps of its graph are not connected.

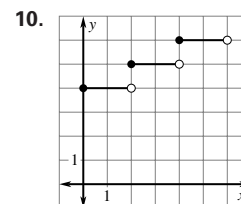
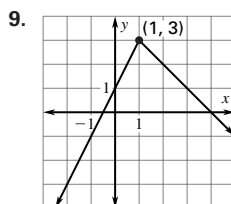
4. True; in substituting $x = 1, 2, 3$ into the greatest integer function, the graphical representation is the same as the earlier step function.

5. $f(10) = 2x + 7 = 20 + 7 = 27$

6. $f(-\frac{1}{3}) = 3(-\frac{1}{3}) - 1 = -1 - 1 = -2$

7. $f(4) = 3(4) - 1 = 12 - 1 = 11$

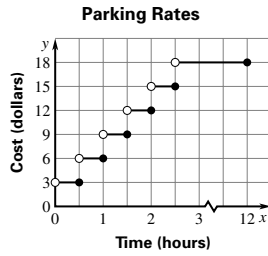
8. $f(-2) = 3(-2) - 1 = -6 - 1 = -7$



11. $f(x) = \begin{cases} -\frac{4}{3}x + 6, & \text{if } 0 \leq x < 3 \\ -\frac{2}{5}x + \frac{16}{5}, & \text{if } 3 \leq x \leq 8 \end{cases}$

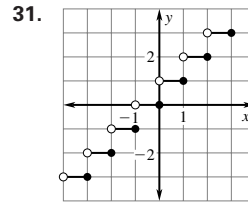
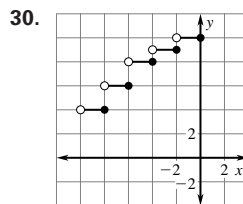
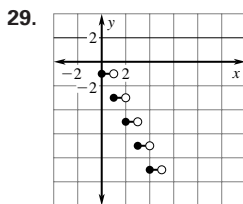
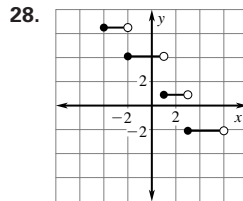
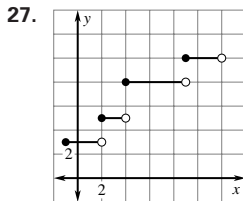
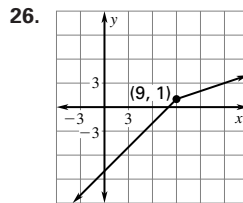
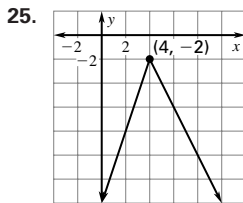
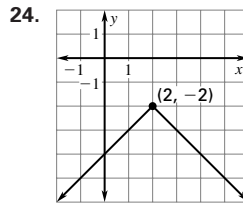
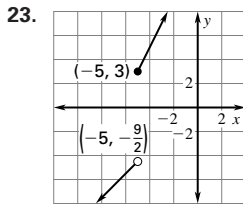
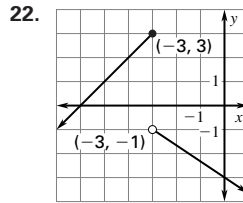
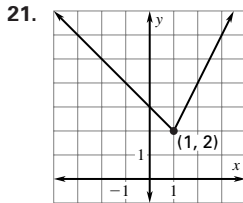
Chapter 2 continued

12. $f(x) = 3$, if $0 < x \leq 0.5$
 6, if $0.5 < x \leq 1$
 9, if $1 < x \leq 1.5$
 12, if $1.5 < x \leq 2$
 15, if $2 < x \leq 2.5$
 18, if $2.5 < x \leq 3$

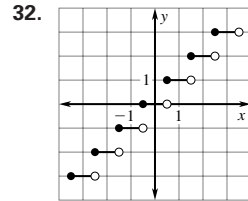


2.7 Practice and Applications (pp. 117–120)

13. $f(-4) = 5(-4) - 1 = -21$
 14. $f(-2) = -2 - 9 = -11$ 15. $f(0) = 0 - 9 = -9$
 16. $f(5) = 5 - 9 = -4$ 17. $h(1) = \frac{1}{2}(1) - 10 = -9.5$
 18. $h(-10) = \frac{1}{2}(-10) - 10 = -15$
 19. $h(6) = \frac{1}{2}(6) - 10 = -7$ 20. $h(0) = \frac{1}{2}(0) - 10 = -10$



Sample answer: The function graphs each x -value to the smallest integer that is not less than it, giving a sort of upper limit to the x -values in each interval.



Sample answer: The function maps each x -value to the integer it rounds to.

33. *Sample answer:* The graph would not change, since the two parts of the piecewise function both give $f(1) = 2$.

34. *Sample answer:* Each open circle on the graph would be replaced by a closed circle and each closed circle by an open circle, since a $<$ sign does not include the endpoint and goes with an open circle, while a \leq sign does include the endpoint and goes with a closed circle.

$$35. f(x) = \begin{cases} y = 2x, & \text{if } x < 0 \text{ (or } x \leq 0) \\ y = x, & \text{if } x \geq 0 \text{ (or } x > 0) \end{cases}$$

$$36. f(x) = \begin{cases} 1, & \text{if } 0 \leq x < 2 \\ 3, & \text{if } 2 \leq x < 4 \\ 5, & \text{if } 4 \leq x < 6 \end{cases}$$

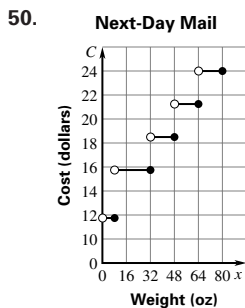
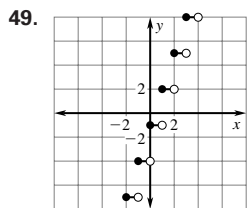
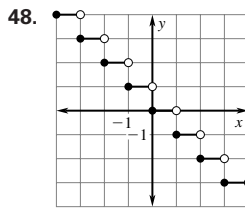
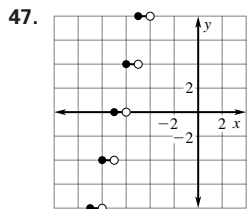
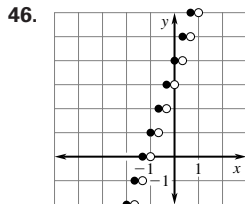
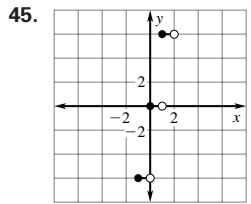
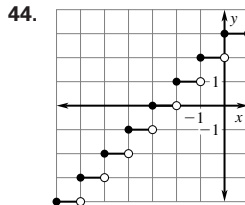
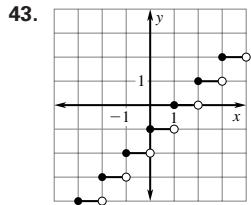
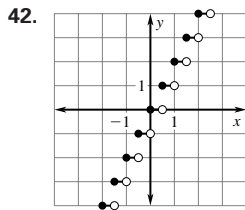
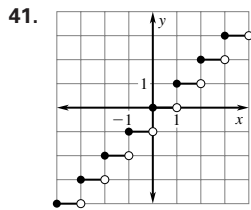
$$37. f(x) = \begin{cases} \frac{3}{2}x + \frac{9}{2}, & \text{if } x < -1 \\ -1, & \text{if } x \geq -1 \end{cases}$$

$$38. f(x) = \begin{cases} 3x + 10, & \text{if } x < -2 \text{ (or } x \leq -2) \\ 4, & \text{if } -2 \leq x \leq 2 \text{ (or } -2 < x < 2) \\ -3x + 10, & \text{if } x > 2 \text{ (or } x \geq 2) \end{cases}$$

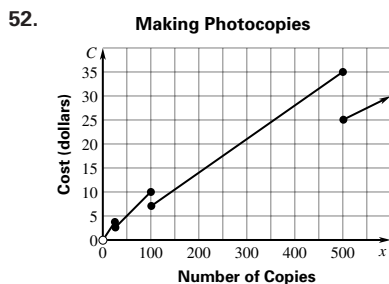
$$39. f(x) = \begin{cases} x + 2, & \text{if } x \leq -1 \\ x + 3, & \text{if } -1 < x < 1 \\ x + 1, & \text{if } x \geq 1 \end{cases}$$

$$40. f(x) = \begin{cases} 1, & \text{if } -1 < x \leq 0 \\ 2, & \text{if } -2 < x \leq -1 \\ 3, & \text{if } -3 < x \leq -2 \\ 4, & \text{if } -4 < x \leq -3 \\ 5, & \text{if } -5 < x \leq -4 \end{cases}$$

Chapter 2 *continued*

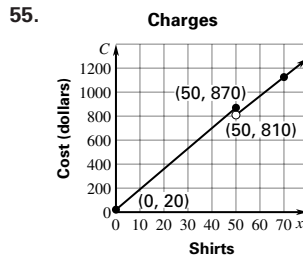


51. domain: $0 < x \leq 80$;
 range: \$11.75, \$15.75, \$18.50, \$21.25, \$24.00

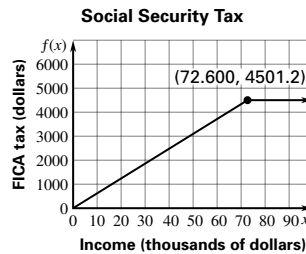


53. 450 copies cost \$31.50, which is more than the cost of 501 copies.

54.
$$c(x) = \begin{cases} 20 + 17x, & \text{if } 0 < x \leq 50 \\ 20 + 15.80x, & \text{if } x > 50 \end{cases}$$

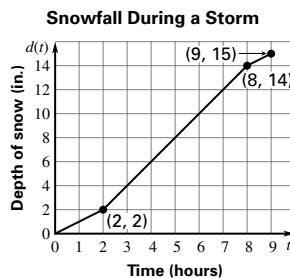


56.
$$f(x) = \begin{cases} 0.062x, & \text{if } 0 < x < 72,600 \\ 4501.20, & \text{if } x \geq 72,600 \end{cases}$$



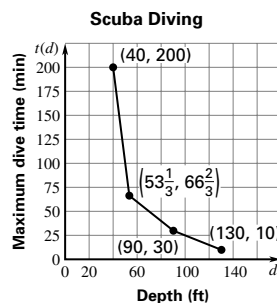
57. \$1860

58.
$$d(t) = \begin{cases} t, & \text{if } 0 \leq t \leq 2 \\ 2t - 2, & \text{if } 2 < t \leq 8 \\ t + 6, & \text{if } 8 \leq t \leq 9 \end{cases}$$



59. 15 in. 60. A 61. B

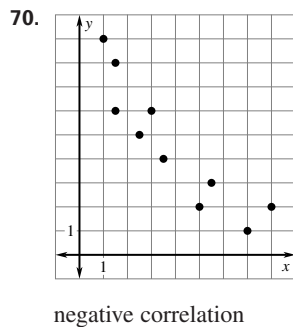
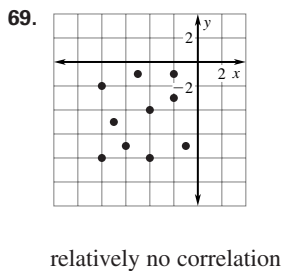
62.
$$t(d) = \begin{cases} 600 - 10d, & \text{if } 40 \leq d < 53\frac{1}{3} \\ 120 - d, & \text{if } 53\frac{1}{3} < d < 90 \\ 75 - 0.5d, & \text{if } 90 \leq d \leq 130 \end{cases}$$



Chapter 2 continued

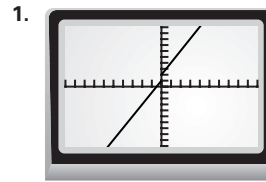
2.7 Mixed Review (p. 120)

63. $|9 + 4x| = 15$
 $9 + 4x = 15$ or $9 + 4x = -15$
 $4x = 6$ or $4x = -24$
 $x = \frac{3}{2}$ or $x = -6$
64. $|7x + 3| = 11$
 $7x + 3 = 11$ or $7x + 3 = -11$
 $7x = 8$ or $7x = -14$
 $x = \frac{8}{7}$ or $x = -2$
65. $|21 - 2x| = 9$
 $21 - 2x = 9$ or $21 - 2x = -9$
 $-2x = -12$ or $-2x = -30$
 $x = 6$ or $x = 15$
66. $|2x + 8| = 1$
 $2x + 8 = 1$ or $2x + 8 = -1$
 $2x = -7$ or $2x = -9$
 $x = -\frac{7}{2}$ or $x = -\frac{9}{2}$
67. $|\frac{1}{2}x - 5| = 11$
 $\frac{1}{2}x - 5 = 11$ or $\frac{1}{2}x - 5 = -11$
 $\frac{1}{2}x = 16$ or $\frac{1}{2}x = -6$
 $x = 32$ or $x = -12$
68. $|1 - \frac{3}{4}x| = 6$
 $1 - \frac{3}{4}x = 6$ or $1 - \frac{3}{4}x = -6$
 $-\frac{3}{4}x = 5$ or $-\frac{3}{4}x = -7$
 $x = -\frac{20}{3}$ or $x = \frac{28}{3}$

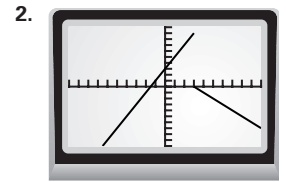


71. $n = -\frac{1}{40}T + 2.5$
 $n = -\frac{1}{40}(0) + 2.5 = 2.5$ in.

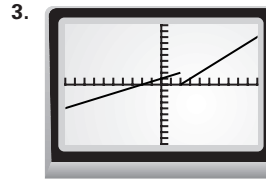
Technology Activity 2.7 (p. 121)



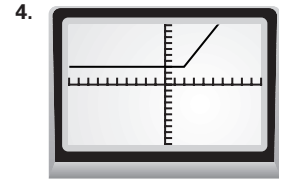
$f(2) = 6$



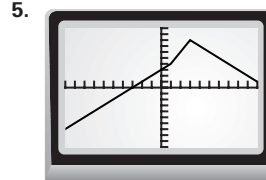
$f(2) = 7$



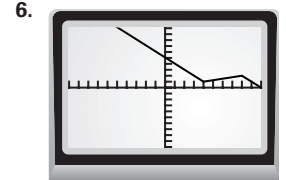
$f(2) = 2$



$f(2) = 3$



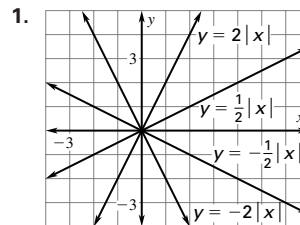
$f(2) = 6$



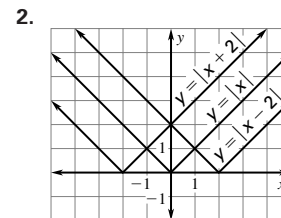
$f(2) = 3$

Lesson 2.8

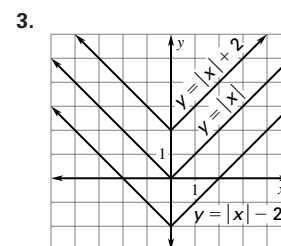
Activity 2.8 (p. 122)



It affects the steepness of the rays, and whether the graph is above or below the x -axis; $(0, 0)$.



A non-zero value of h causes a horizontal shift in the graph; $(h, 0)$.

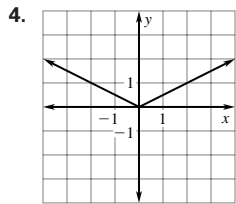


A non-zero value of k causes a vertical shift in the graph; $(0, k)$.

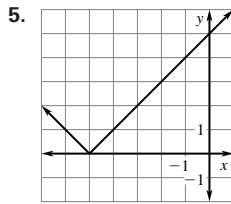
Chapter 2 *continued*

2.8 Guided Practice (p. 125)

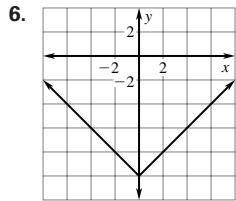
- the vertex of the graph
- If a is positive, it opens up; if a is negative, it opens down. If $a < 1$, the graph is wider than $y = |x|$. If $a = 1$, the graph has the same shape as that of $y = |x|$. If $a > 1$ the graph is narrower.
- The vertex should be at $(-3, 2)$, not $(3, 2)$. The general form of the equation for an absolute value graph is $y = a|x - h| + k$ and $|x + 3| = |x - (-3)|$ so $h = -3$.



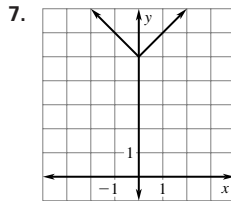
$(0, 0)$; opens up; wider



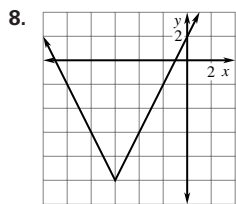
$(-5, 0)$; opens up; same width



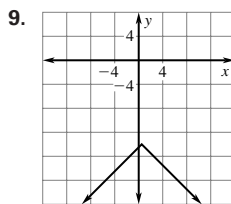
$(0, -10)$; opens up; same width



$(0, 5)$; opens up; same width



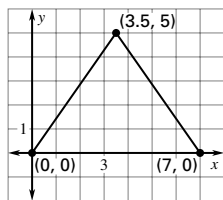
$(-6, -10)$; opens up; narrower



$(\frac{1}{2}, -14)$; opens down; same width

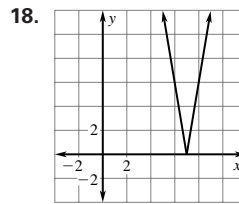
10. $y = |x - 4| + 1$

11. $y = -\frac{10}{7}|x - 3.5| + 5$;
domain: $0 \leq x \leq 7$
range: $0 \leq y \leq 5$

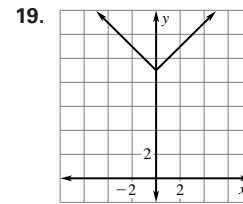


2.7 Practice and Applications (p. 125)

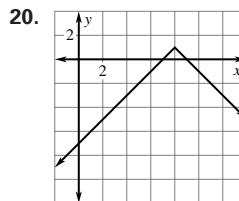
12. B 13. C 14. A 15. C 16. A 17. B



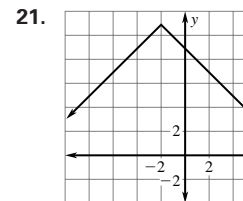
$(7, 0)$; opens up; narrower



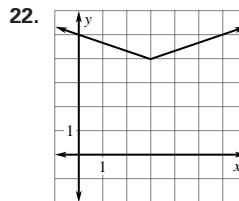
$(0, 9)$; opens up; same width



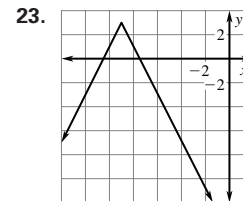
$(8, 1)$; opens down; same width



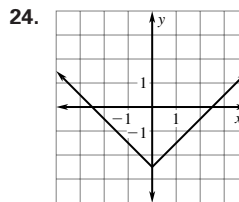
$(-2, 11)$; opens down; same width



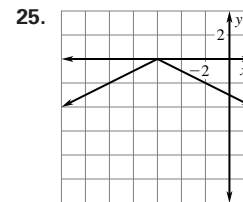
$(3, 4)$; opens up; wider



$(-9, 3)$; opens down; narrower



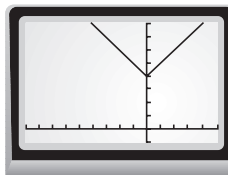
$(0, -\frac{5}{2})$; opens up; same width



$(-6, 0)$; opens down; wider

26. $10 = |x| + 4$

$x = 6$ or $x = -6$

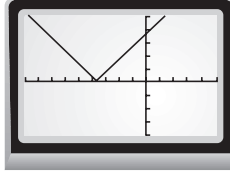


Chapter 2 continued

27. $9 = |x + 14|$

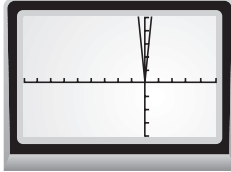
$$x + 14 = 9 \quad \text{or} \quad x + 14 = -9$$

$$x = -5 \quad \text{or} \quad x = -23$$



28. $\frac{3}{2} = 15|x|$

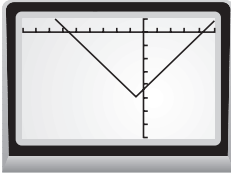
$$x = -\frac{1}{10} \quad \text{or} \quad x = \frac{1}{10}$$



29. $5 = |x + \frac{4}{7}|$

$$x + \frac{4}{7} = -5 \quad \text{or} \quad x + \frac{4}{7} = 5$$

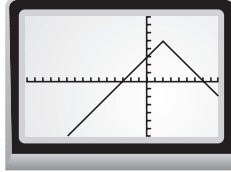
$$x = -5\frac{4}{7} \quad \text{or} \quad x = 4\frac{3}{7}$$



30. $|x - 2| = 4.5$

$$x - 2 = 4.5 \quad \text{or} \quad x - 2 = -4.5$$

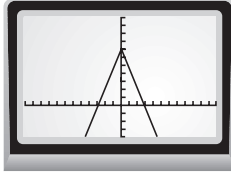
$$x = 6.5 \quad \text{or} \quad x = -2.5$$



31. $-9 = -3.2|x|$

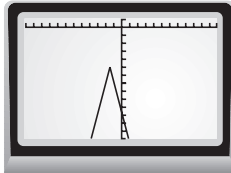
$$-9 = -3.2x \quad \text{or} \quad 9 = -3.2x$$

$$x = 2.8125 \quad \text{or} \quad x = -2.8125$$



32. $0 = |x + 1.5|$

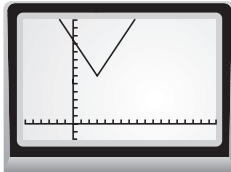
$$x = -1.5$$



33. $\frac{3}{2} = |x - 3|$

$$x - 3 = -\frac{3}{2} \quad \text{or} \quad x - 3 = \frac{3}{2}$$

$$x = 1.5 \quad \text{or} \quad x = 4.5$$



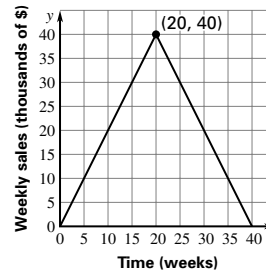
34. $y = 2|x|$

35. $y = -|x - 3| + 1$ 36. $y = \frac{1}{2}|x + 2|$

37. $y = 2|x + 1| - 1$ 38. $y = -\frac{1}{3}|x - 2| + 6$

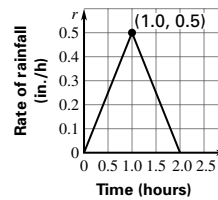
39. $y = -4|x| + 20$

40. Music Single Sales



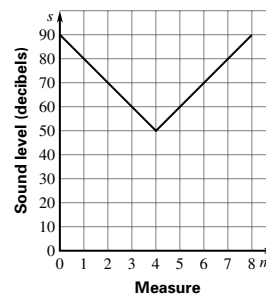
41. 40 singles

42. Rainstorm Log



43. 2 h; 1 hour into the storm

44. Orchestra Directions

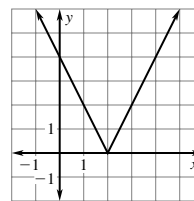


45. after 2 measures and again after 6 measures.

46. $y = -\frac{12}{7}|x - 6| + 8$; yes

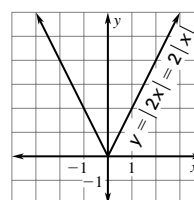
47. $y = 2|x - 2|$

48. $y = -37.9|x| + 853$

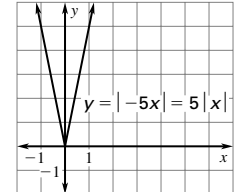


49. C 50. D

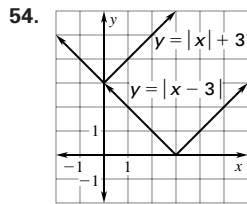
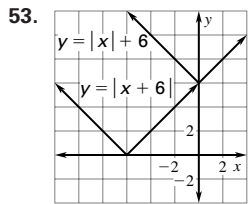
51.



52.



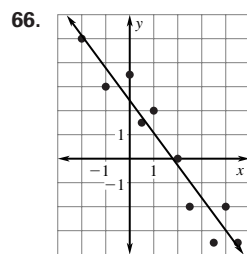
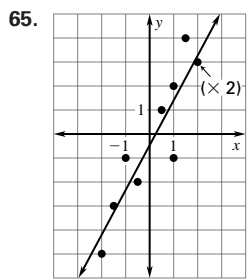
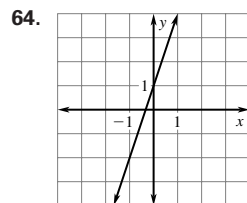
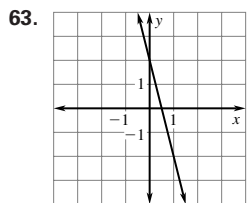
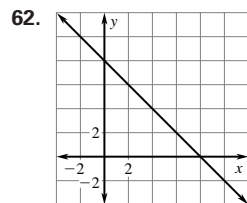
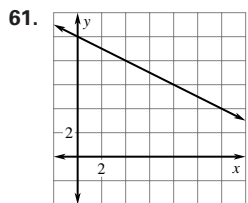
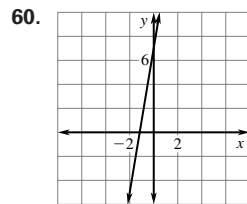
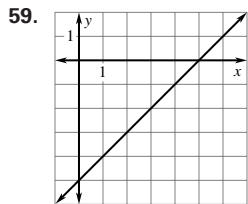
Chapter 2 continued



55. Sample answer: $|ab| = |a| \cdot |b|$, but $|a + b| \neq |a| + |b|$ for all values of a and b . For example $|3 + 6| = 9 = |3| + |6|$, but $|-3 + 6| = 3 \neq |-3| + |6| = 9$.

2.8 Mixed Review • (page 128)

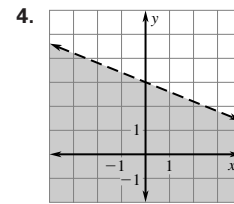
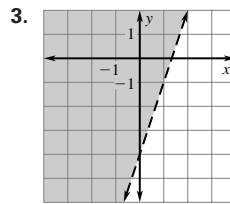
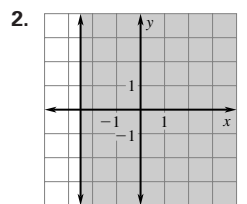
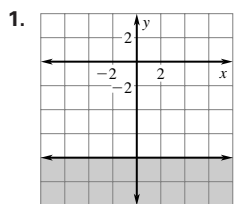
56. $y = \frac{3}{5}x - \frac{8}{5}$ 57. $y = -3x - \frac{9}{2}$ 58. $y = -\frac{2}{15}x - \frac{2}{3}$



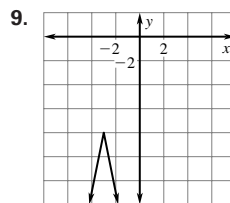
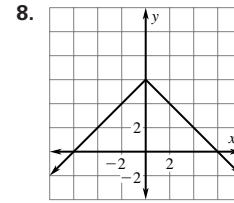
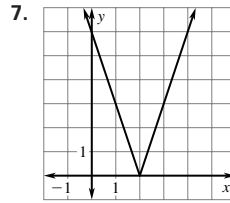
$y = 1.87x - 0.46$

$y = -1.35x + 2.42$

Quiz 3 (p. 128)



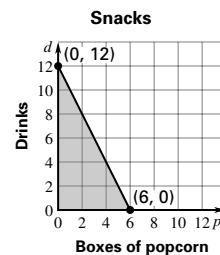
5. $f(5) = 2(5) - 3 = 7$ 6. $f(0) = 5$



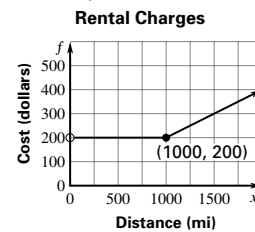
10. $y = \frac{3}{2}|x - 2|$

11. $y = -|x + 2| + 2$ 12. $y = \frac{1}{3}|x + 1| + 2$

13. $2.5p + 1.25d \leq 15$



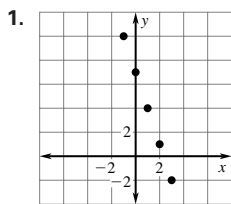
14. $f(x) = \begin{cases} 200, & \text{if } 0 < x \leq 1000 \\ 0.2x, & \text{if } x > 1000 \end{cases}$



$f(1200) = 0.2(1200) = \$240$

Chapter 2 continued

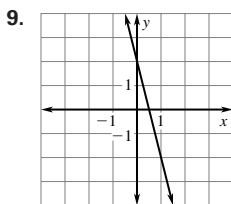
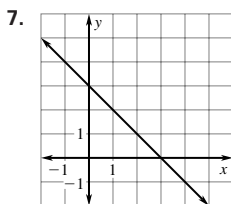
Chapter 2 Review (pp. 130–132)



yes

3. $m = \frac{0 - 6}{-6 - 3} = \frac{-6}{-9} = \frac{2}{3}$

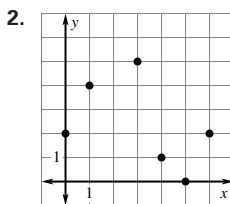
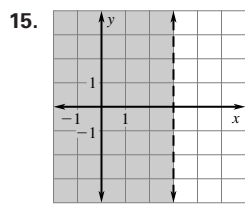
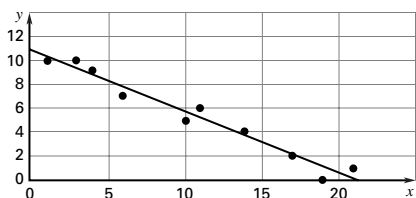
5. $m = \frac{-4 - 2}{-1 + 7} = \frac{-6}{6} = -1$



11. $y - 2 = -1(x - 0)$
 $y = -x + 2$

13. $y - 2 = \frac{2 + 8}{8 - 3}(x - 8)$
 $y - 2 = 2x - 16$
 $y = 2x - 14$

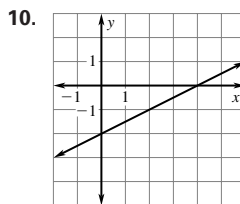
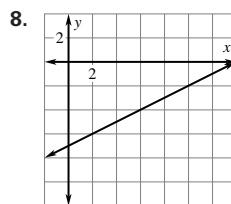
14. $y = -0.509x + 10.8$



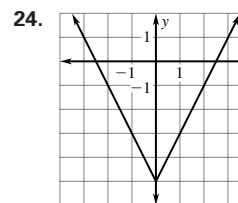
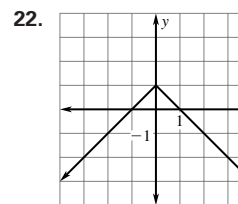
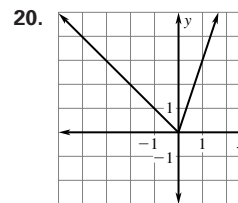
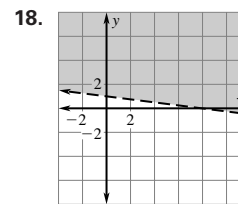
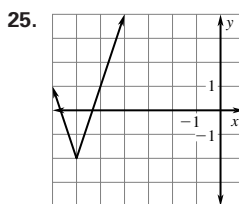
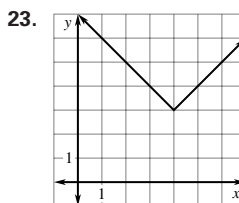
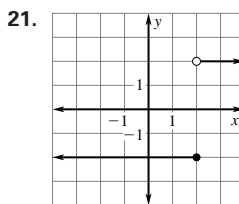
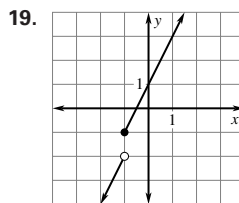
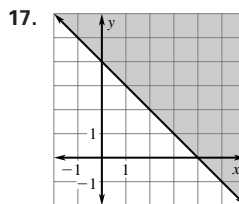
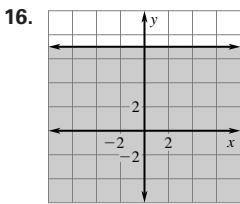
yes

4. $m = \frac{4 - 4}{-2 - 2} = \frac{0}{-4} = 0$

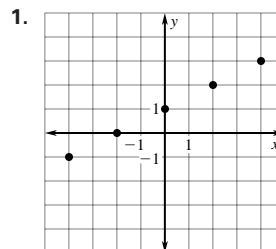
6. $m = \frac{4 - 1}{5 - 5} = \frac{3}{0}$; undefined



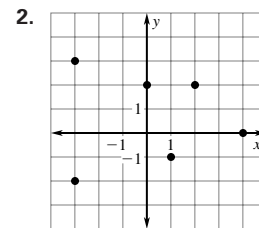
12. $y - 1 = 3(x + 4)$
 $y = 3x + 13$



Chapter 2 Test (p. 133)



yes



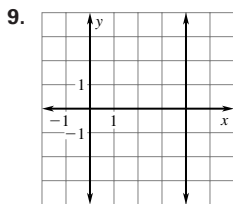
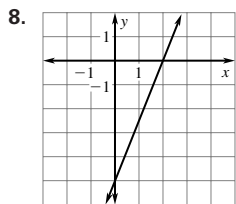
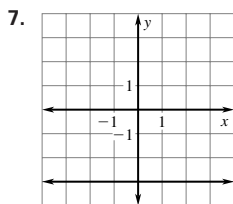
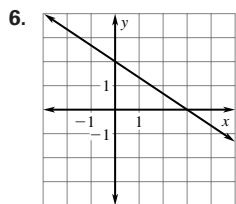
no

3. $f(5) = 80 - 3(5) = 80 - 15 = 65$

4. $f(-1) = (-1)^2 + 4(-1) - 7 = 1 - 4 - 7 = -10$

5. $f(2) = 3|2 - 4| + 2 = 3(2) + 2 = 8$

Chapter 2 continued



10. $y = \frac{3}{4}x - 5$

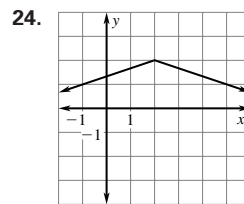
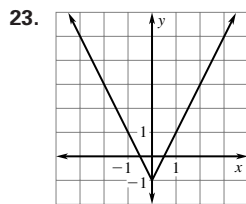
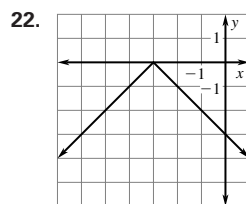
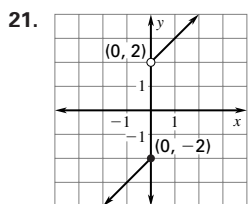
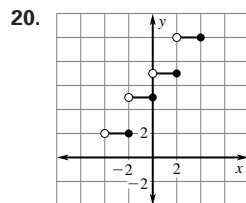
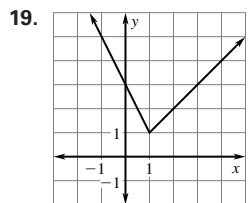
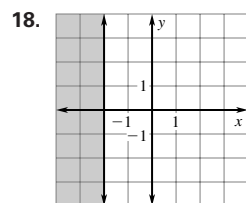
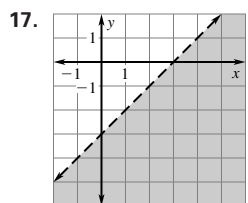
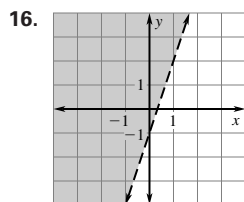
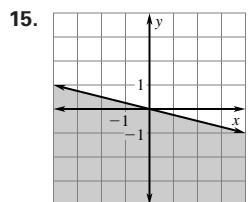
11. $y + 4 = -1(x - 2)$
 $y = -x - 2$

12. $y - 8 = \frac{8 - 5}{-6 + 2}(x + 6)$
 $y - 8 = -\frac{3}{4}x - \frac{9}{2}$
 $y = -\frac{3}{4}x + \frac{7}{2}$

13. $m_1 = 1$
 $y - 2 = x + 3$
 $y = x + 5$

14. $m_1 = -3$

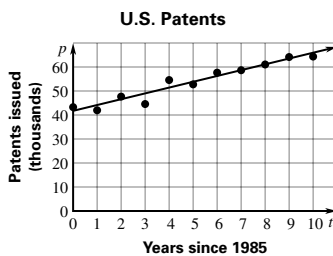
$m_2 = \frac{1}{3}$
 $y - 4 = \frac{1}{3}(x - 1)$
 $y = \frac{1}{3}x + \frac{11}{3}$



25. about 0.00397 mi/sec²

26. $m = \frac{1}{2}h$
 $m = \frac{1}{2}(66)$
 $m = 33$ in.

27.



The scatter plot shows a positive correlation, which means as the number of years since 1985 increased, the number of patents issued tended to increase.

$p = 2.42t + 41.7$

Standardized Chapter 2 Test (pp. 134–135)

1. C 2. $f(-5) = -25 + 35 - 22 = -12$; C

3. $m = \frac{5 + 9}{0 + 4} = \frac{14}{4} = \frac{7}{2}$; E

4. x -intercept: -5 5. D 6. E

y -intercept: 3

C

7. $y + 1 = \frac{7 + \frac{1}{4}}{0 + 4}(x + 4)$

$y + 1 = 2(x + 4)$

$y = 2x + 7$

C

8. $m_1 = -2$

$m_2 = \frac{1}{2}$

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

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

A

9. E 10. $f(4) = -4 + 6 = 2$; A 11. D 12. B

13. A

14. a. $120 \div 15 = 8$ rows + 1 = 9 rows

b. $120 \div 12 = 10$ rows + 1 = 11 rows

c. $15p + 12g = 135$

d. $15(5) + 12g = 135$

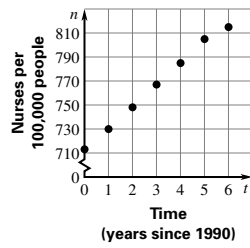
$12g = 60$

$g = 5$ rows

Chapter 2 *continued*

15. a.

Nurse Numbers



b. positive correlation

c. *Sample answer:* $n = 18.1t + 715$

d. $n = 18.1(20) + 715 = 362 + 715 = 1077$

about 1077 nurses per 100,000 people

16. a. $y = 1.33|x - 6.25|$

b. $y = 0.857|x - 7.5|$

c. $y = 0.632|x - 8.75|$

d. $(6.25, 0)$