

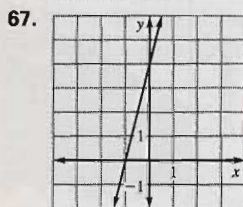
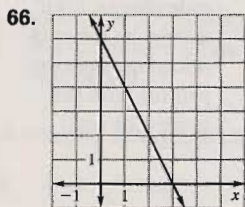
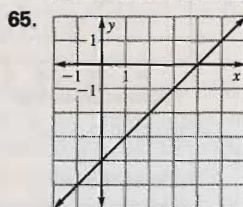
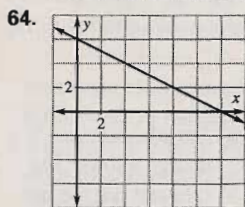
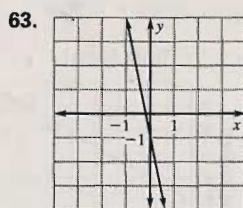
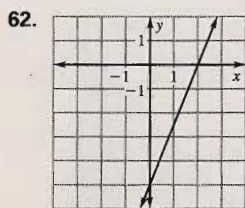
Chapter 2 continued

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

69. $y - 7 = \frac{7 - 1}{0 - 1}(x - 0)$
 $y - 7 = -\frac{6}{1}x$
 $y = -6x + 7$

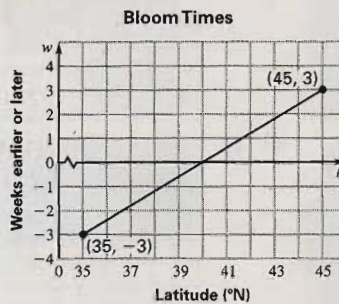
70. $y - 6 = \frac{6 + 2}{-1 - 8}(x + 1)$
 $y - 6 = -\frac{8}{9}(x + 1)$
 $y = -\frac{8}{9}x + \frac{46}{9}$

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

72. $y - 9 = \frac{9 + 6}{1 + 10}(x - 1)$
 $y - 9 = \frac{15}{11}(x - 1)$
 $y = \frac{15}{11}x + \frac{84}{11}$

73. $y + 8 = \frac{-8 + 8}{-7 - 4}(x - 4)$
 $y + 8 = 0$
 $y = -8$

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;

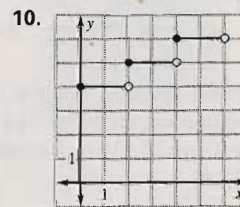
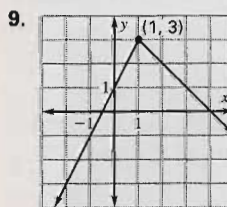
Piecewise:

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

Step function:

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

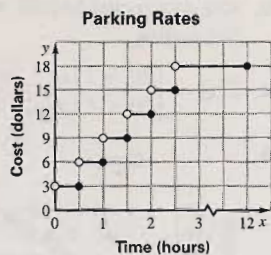
2. The point is included; the point is not included.
 3. False; *Sample answer:* The separate pieces are graphs of different functions. The graphs don't have to be connected. For example, a step function is a piecewise function, but the steps of its graph are not connected.
 4. True; in substituting $x = 1, 2, 3$ 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. $f(x) = \begin{cases} -\frac{4}{3}x + 6, & \text{if } 0 \leq x < 3 \\ -\frac{2}{5}x + \frac{16}{5}, & \text{if } 3 \leq x \leq 8 \end{cases}$

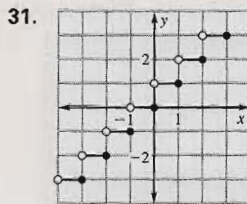
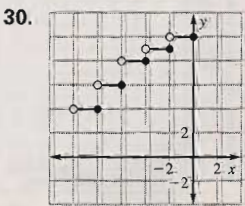
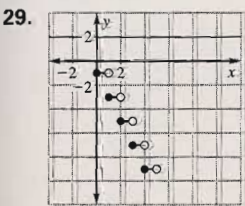
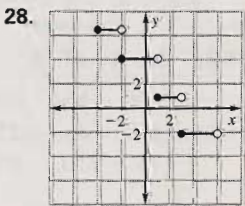
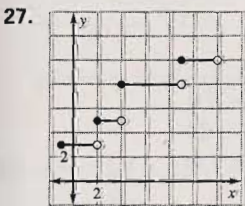
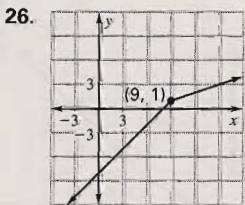
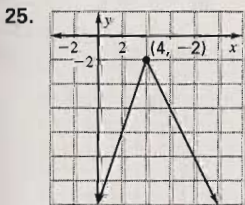
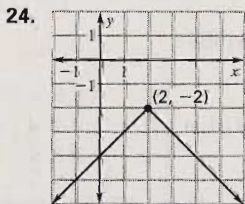
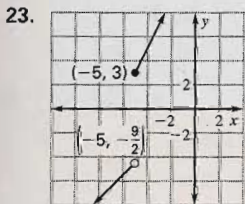
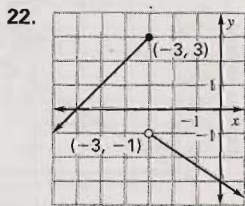
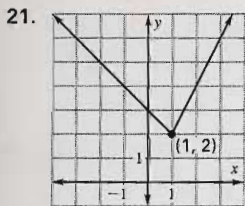
Chapter 2 continued

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 $2.5 < x \leq 12$

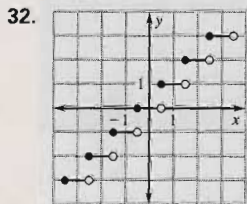


2.7 Practice and Applications (pp. 117-120)

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

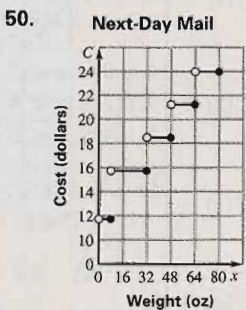
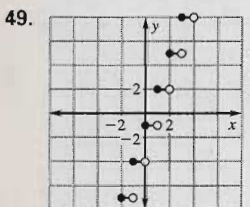
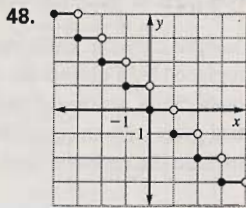
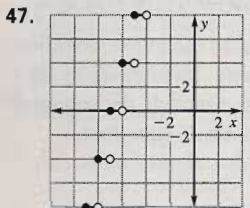
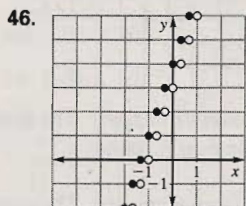
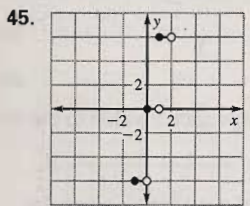
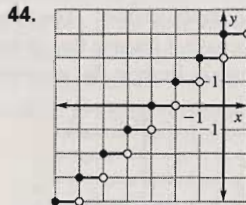
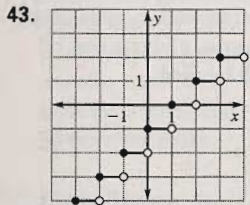
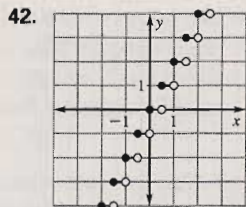
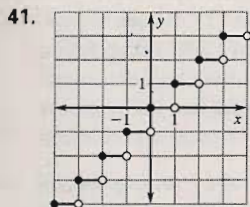
37. $f(x) = \begin{cases} \frac{3}{2}x + \frac{9}{2}, & \text{if } x < -1 \\ -1, & \text{if } x \geq -1 \end{cases}$

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

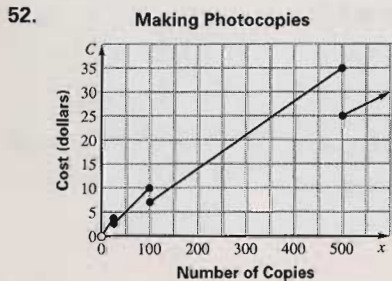
39. $f(x) = \begin{cases} x + 2, & \text{if } x \leq -1 \\ x + 3, & \text{if } -1 < x < 1 \\ x + 1, & \text{if } x \geq 1 \end{cases}$

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

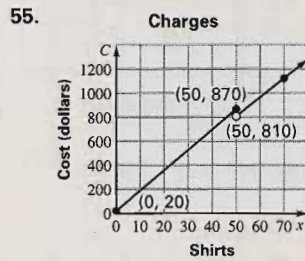


51. domain: $0 < x \leq 80$;
 range: \$11.75, \$15.75, \$18.50, \$21.25, \$24.00

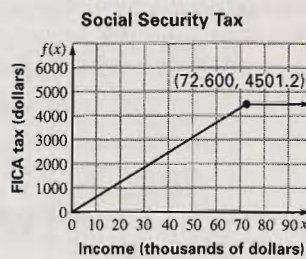


53. 450 copies cost \$31.50, which is more than the cost of 501 copies.

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

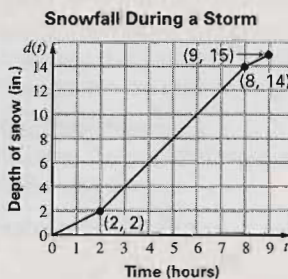


56.
$$f(x) = \begin{cases} 0.062x, & \text{if } 0 < x < 72,600 \\ 4501.20, & \text{if } x \geq 72,600 \end{cases}$$



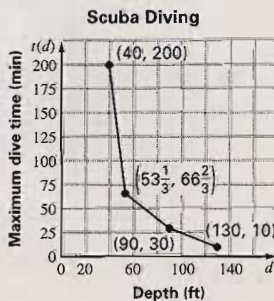
57. \$1860

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. $|9 + 4x| = 15$

$$9 + 4x = 15 \text{ or } 9 + 4x = -15$$

$$4x = 6 \text{ or } 4x = -24$$

$$x = \frac{3}{2} \text{ or } x = -6$$

64. $|7x + 3| = 11$

$$7x + 3 = 11 \text{ or } 7x + 3 = -11$$

$$7x = 8 \text{ or } 7x = -14$$

$$x = \frac{8}{7} \text{ or } x = -2$$

65. $|21 - 2x| = 9$

$$21 - 2x = 9 \text{ or } 21 - 2x = -9$$

$$-2x = -12 \text{ or } -2x = -30$$

$$x = 6 \text{ or } x = 15$$

66. $|2x + 8| = 1$

$$2x + 8 = 1 \text{ or } 2x + 8 = -1$$

$$2x = -7 \text{ or } 2x = -9$$

$$x = -\frac{7}{2} \text{ or } x = -\frac{9}{2}$$

67. $|\frac{1}{2}x - 5| = 11$

$$\frac{1}{2}x - 5 = 11 \text{ or } \frac{1}{2}x - 5 = -11$$

$$\frac{1}{2}x = 16 \text{ or } \frac{1}{2}x = -6$$

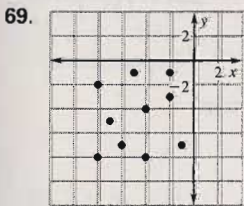
$$x = 32 \text{ or } x = -12$$

68. $|1 - \frac{3}{4}x| = 6$

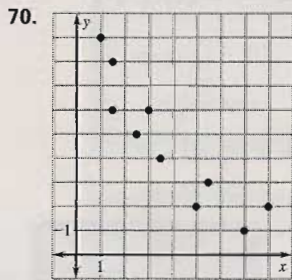
$$1 - \frac{3}{4}x = 6 \text{ or } 1 - \frac{3}{4}x = -6$$

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

$$x = -\frac{20}{3} \text{ or } x = \frac{28}{3}$$



relatively no correlation

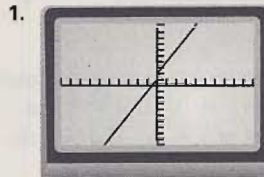


negative correlation

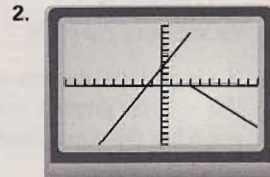
71. $n = -\frac{1}{40}T + 2.5$

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

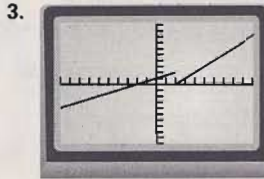
Technology Activity 2.7 (p. 121)



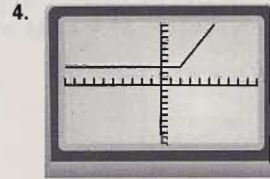
$$f(2) = 6$$



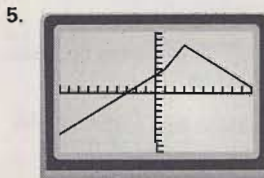
$$f(2) = 7$$



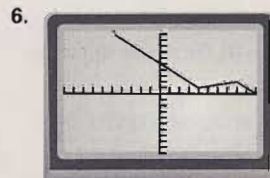
$$f(2) = 2$$



$$f(2) = 3$$



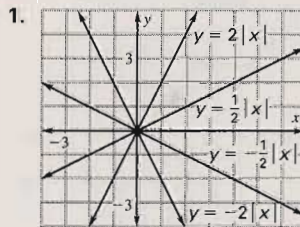
$$f(2) = 6$$



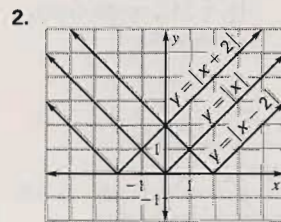
$$f(2) = 3$$

Lesson 2.8

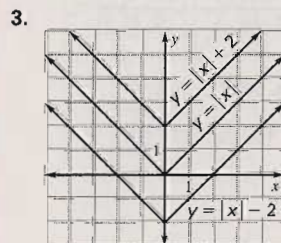
Activity 2.8 (p. 122)



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; $(h, 0)$.

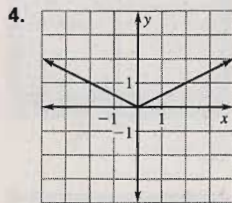


A non-zero value of k causes a vertical shift in the graph; $(0, k)$.

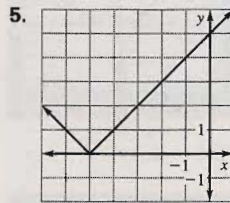
Chapter 2 continued

2.8 Guided Practice (p. 125)

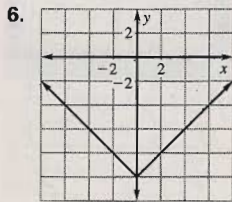
- the vertex of the graph
- If a is positive, it opens up; if a is negative, it opens down. If $a < 1$, the graph is wider than $y = |x|$. If $a = 1$, the graph has the same shape as that of $y = |x|$. If $a > 1$ the graph is narrower.
- The vertex should be at $(-3, 2)$, not $(3, 2)$. The general form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



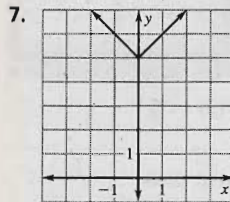
$(0, 0)$; opens up; wider



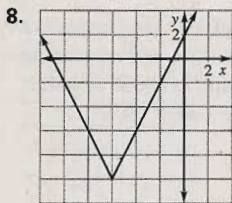
$(-5, 0)$; opens up; same width



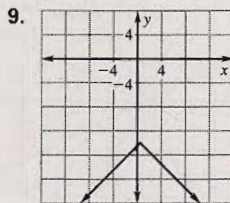
$(0, -10)$; opens up; same width



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



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



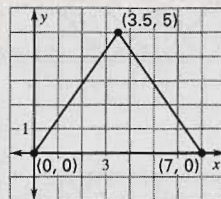
$(\frac{1}{2}, -14)$; opens down; same width

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

11. $y = -\frac{10}{7}|x - 3.5| + 5$;

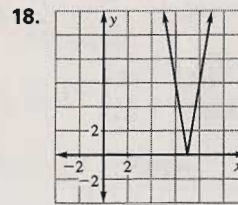
domain: $0 \leq x \leq 7$

range: $0 \leq y \leq 5$

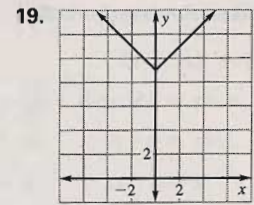


2.7 Practice and Applications (p. 125)

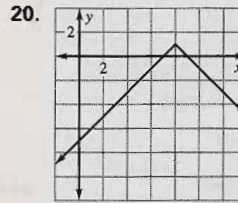
12. B 13. C 14. A 15. C 16. A 17. B



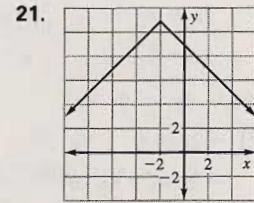
$(7, 0)$; opens up; narrower



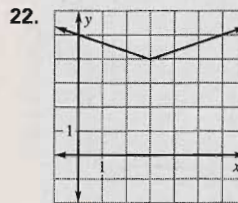
$(0, 9)$; opens up; same width



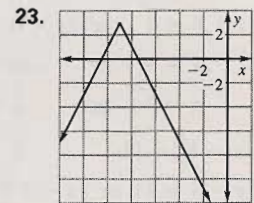
$(8, 1)$; opens down; same width



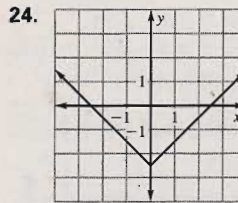
$(-2, 11)$; opens down; same width



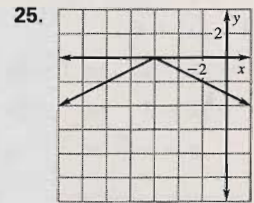
$(3, 4)$; opens up; wider



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



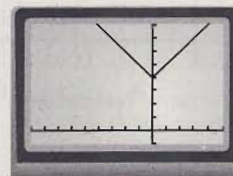
$(0, -\frac{5}{2})$; opens up; same width



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

26. $10 = |x| + 4$

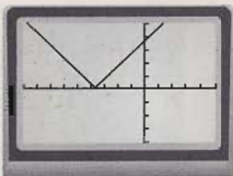
$x = 6$ or $x = -6$



Chapter 2 continued

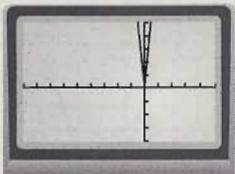
27. $9 = |x + 14|$

$x + 14 = 9$ or $x + 14 = -9$
 $x = -5$ or $x = -23$



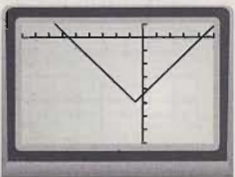
28. $\frac{3}{2} = 15|x|$

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



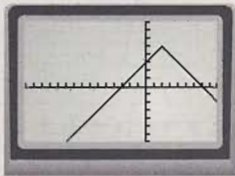
29. $5 = |x + \frac{4}{7}|$

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



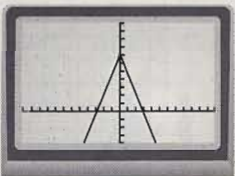
30. $|x - 2| = 4.5$

$x - 2 = 4.5$ or $x - 2 = -4.5$
 $x = 6.5$ or $x = -2.5$



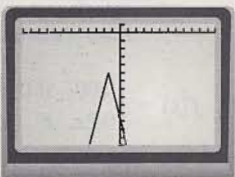
31. $-9 = -3.2|x|$

$-9 = -3.2x$ or $9 = -3.2x$
 $x = 2.8125$ or $x = -2.8125$



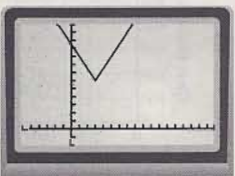
32. $0 = |x + 1.5|$

$x = -1.5$



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

$x - 3 = -\frac{3}{2}$ or $x - 3 = \frac{3}{2}$
 $x = 1.5$ or $x = 4.5$



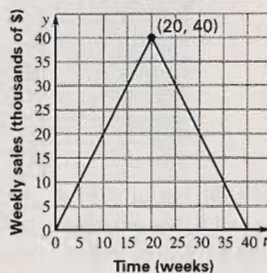
34. $y = 2|x|$

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

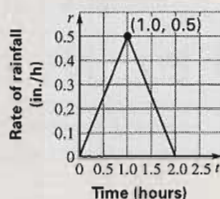
37. $y = 2|x + 1| - 1$ 38. $y = -\frac{1}{3}|x - 2| + 6$

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

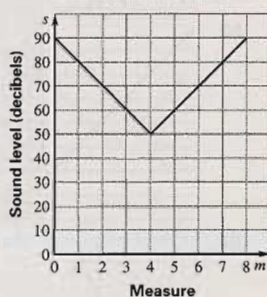
40. Music Single Sales



42. Rainstorm Log

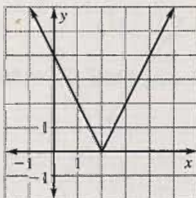


44. Orchestra Directions

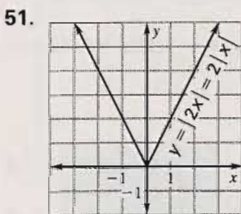


46. $y = -\frac{12}{7}|x - 6| + 8$; yes

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



49. C 50. D

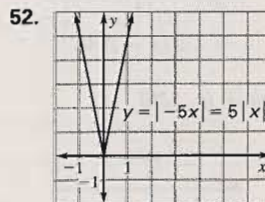


41. 40 singles

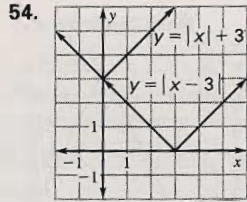
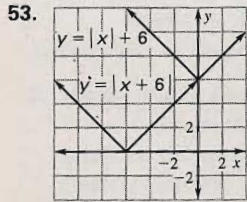
43. 2 h; 1 hour into the storm

45. after 2 measures and again after 6 measures.

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



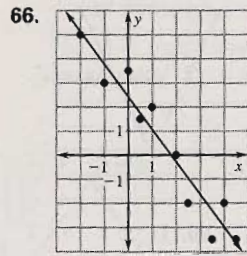
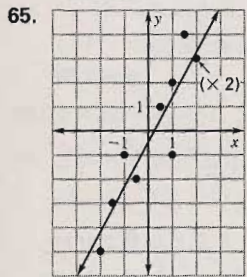
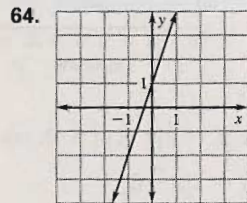
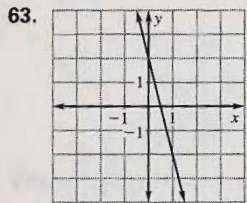
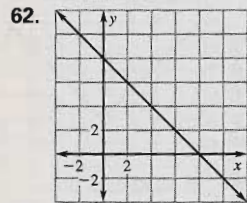
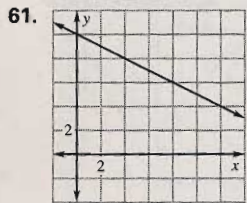
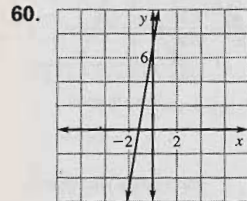
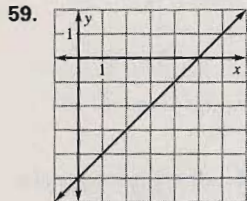
Chapter 2 continued



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)

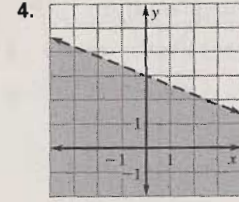
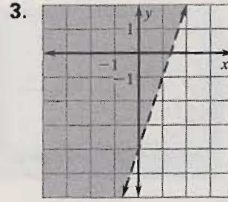
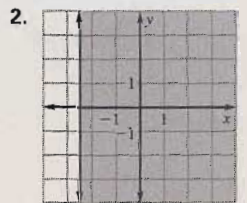
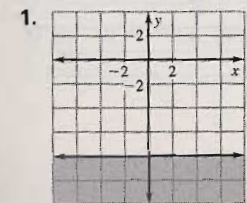
56. $y = \frac{3}{5}x - \frac{8}{5}$ 57. $y = -3x - \frac{9}{2}$ 58. $y = -\frac{2}{15}x - \frac{2}{3}$



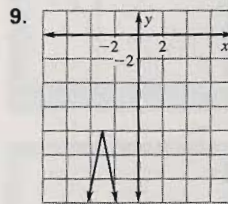
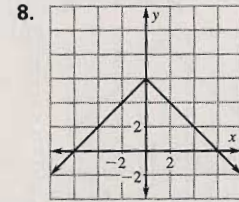
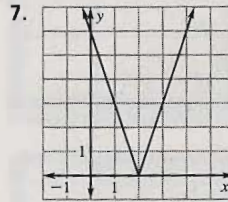
$y = 1.87x - 0.46$

$y = -1.35x + 2.42$

Quiz 3 (p. 128)



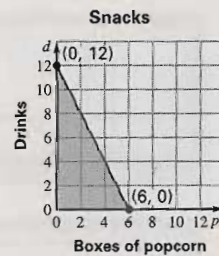
5. $f(5) = 2(5) - 3 = 7$ 6. $f(0) = 5$



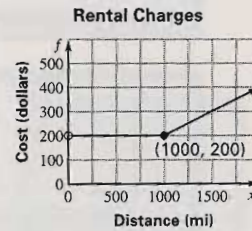
10. $y = \frac{3}{2}|x - 2|$

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

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



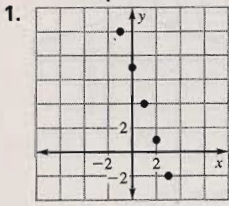
14. $f(x) = \begin{cases} 200, & \text{if } 0 < x \leq 1000 \\ 0.2x, & \text{if } x > 1000 \end{cases}$



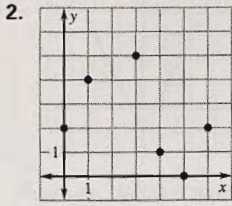
$f(1200) = 0.2(1200) = \$240$

Chapter 2 continued

Chapter 2 Review (pp. 130–132)



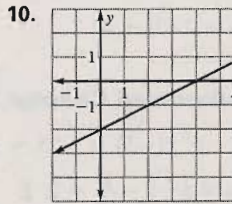
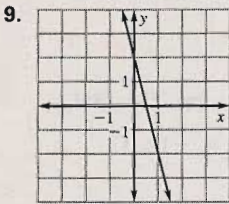
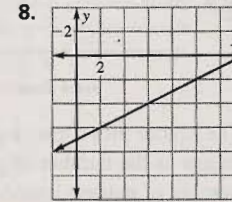
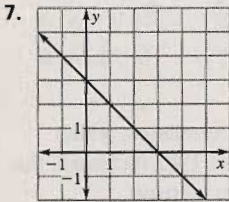
yes



yes

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

5. $m = \frac{-4 - 2}{-1 + 7} = \frac{-6}{6} = -1$ 6. $m = \frac{4 - 1}{5 - 5} = \frac{3}{0}$,
undefined

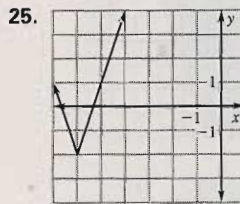
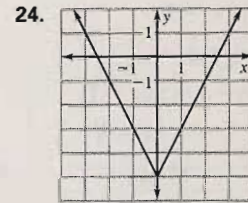
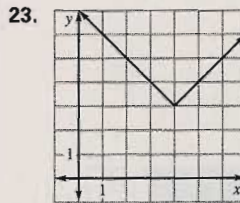
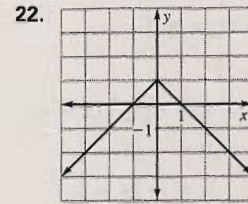
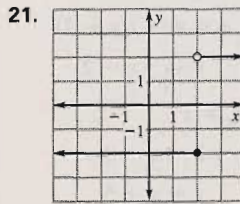
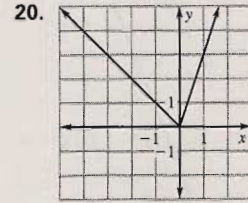
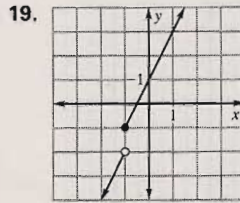
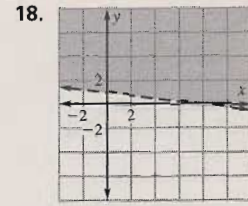
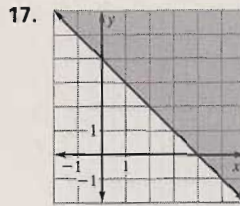
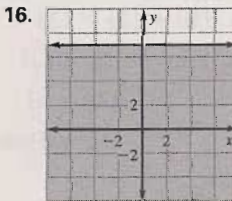
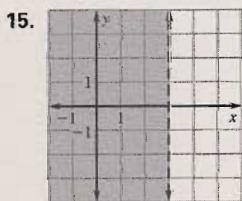
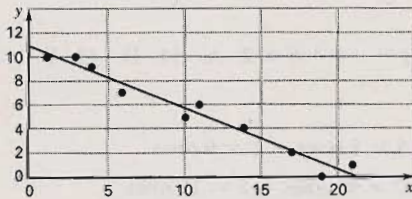


11. $y - 2 = -1(x - 0)$
 $y = -x + 2$

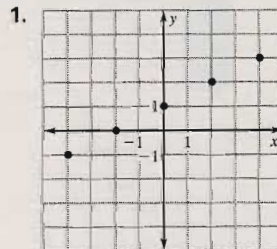
12. $y - 1 = 3(x + 4)$
 $y = 3x + 13$

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

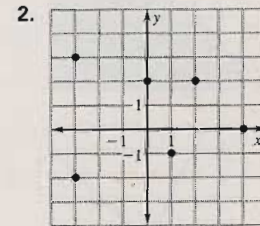
14. $y = -0.509x + 10.8$



Chapter 2 Test (p. 133)



yes



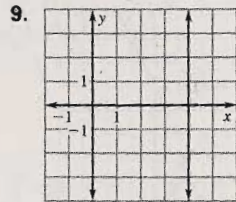
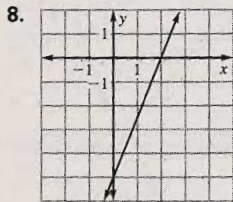
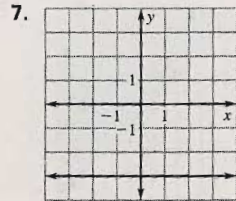
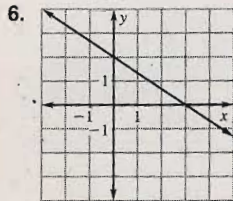
no

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



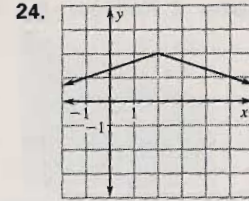
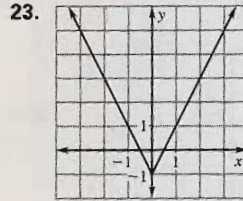
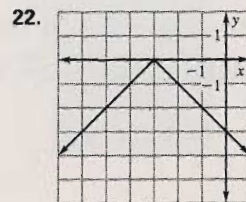
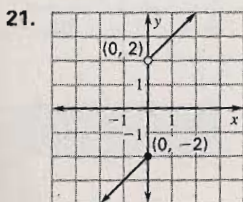
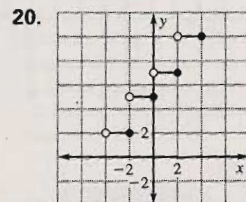
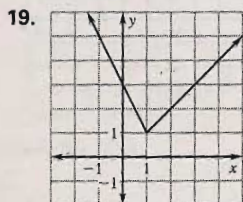
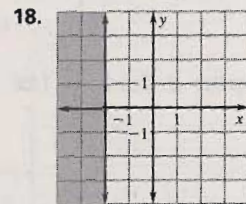
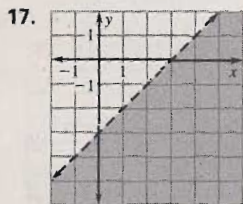
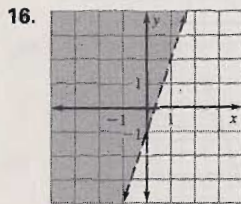
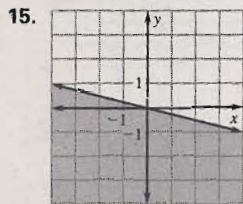
10. $y = \frac{3}{4}x - 5$

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

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

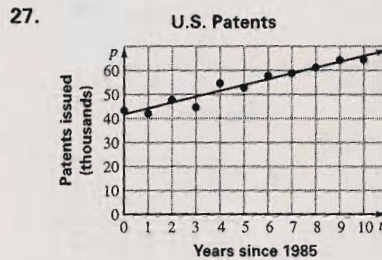
13. $m_1 = 1$
 $y - 2 = x + 3$
 $y = x + 5$

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.



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

8. $m_1 = -2$

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

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

$y = 2x + 7$

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

C

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

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. $15p + 12g = 135$

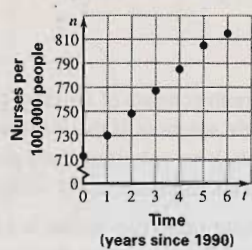
d. $15(5) + 12g = 135$

$12g = 60$

$g = 5$ 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. $(6.25, 0)$