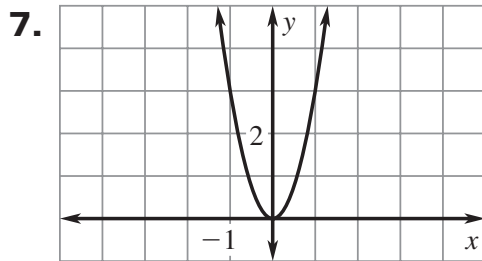


Answers for 4.1

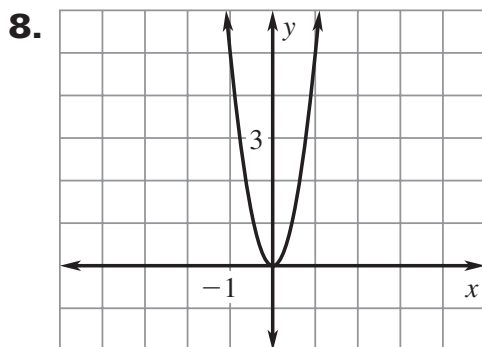
For use with pages 240–243

4.1 Skill Practice

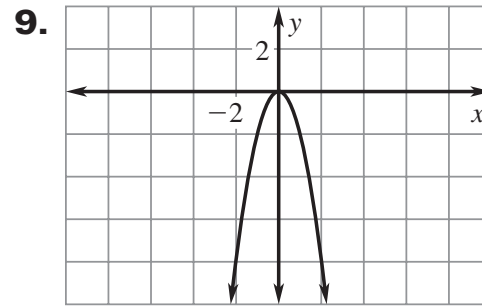
1. parabola
2. For the parabola $y = ax^2 + bx + c$ with $a \neq 0$, if $a < 0$ then the function has a maximum value and if $a > 0$ the function has a minimum value.
3. 16, 4, 0, 4, 16
4. -12, -3, 0, -3, -12
5. 8, 2, 0, 2, 8
6. -12, -3, 0, -3, -12



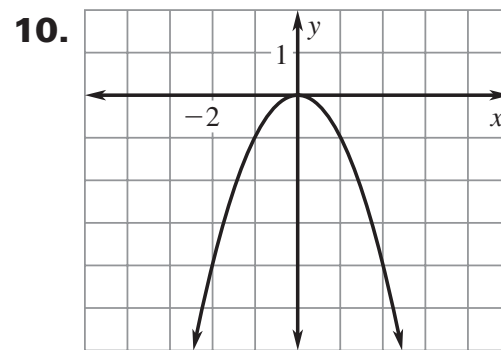
same axis of symmetry and vertex, opens up, and is narrower



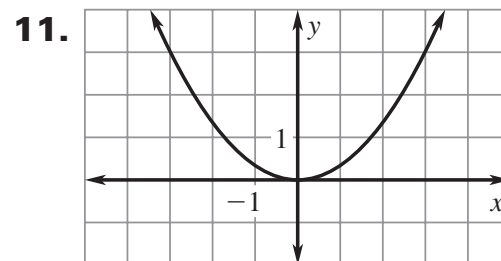
same axis of symmetry and vertex, opens up, and is narrower



same axis of symmetry and vertex, opens down, and is narrower

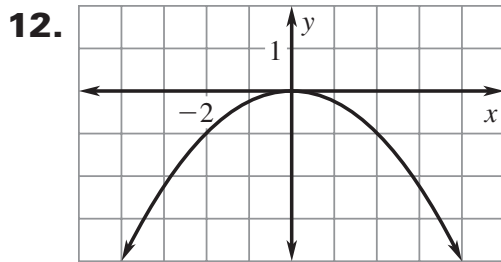


same axis of symmetry and vertex, opens down

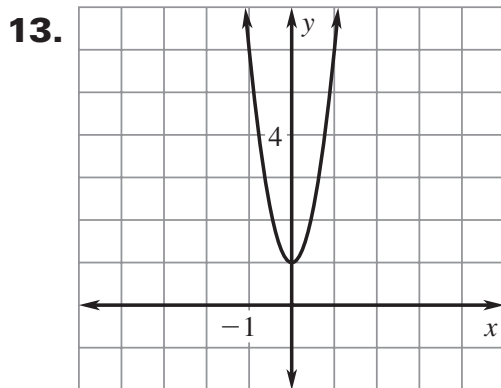


same axis of symmetry and vertex, opens up, and is wider

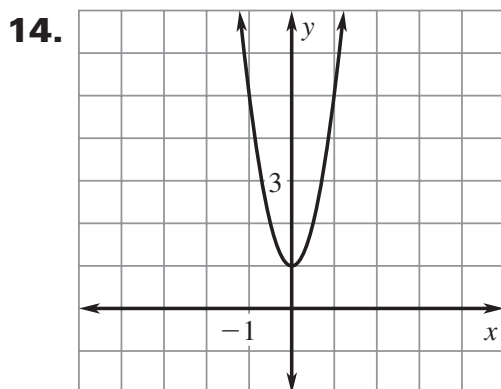
Answers for 4.1 *continued*
For use with pages 240–243



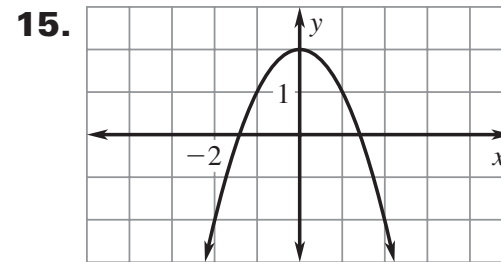
same axis of symmetry and vertex, opens down, and is wider



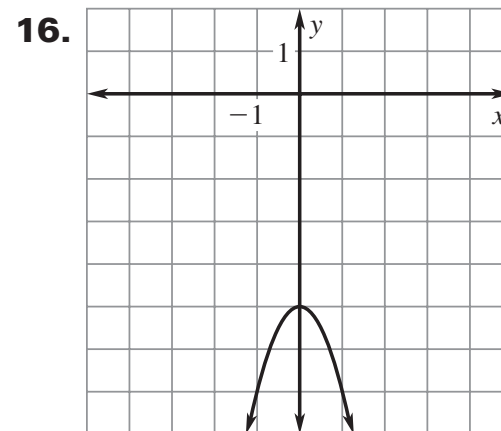
same axis of symmetry, vertex is shifted up 1 unit, opens up, and is narrower



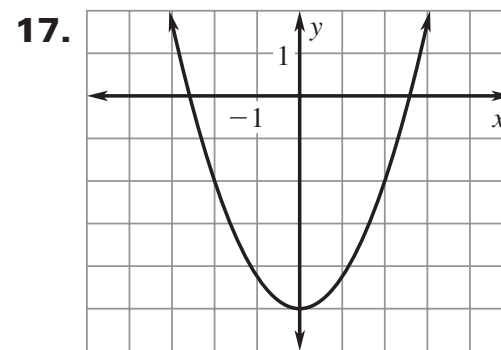
same axis of symmetry, vertex is shifted up 1 unit, opens up, and is narrower



same axis of symmetry, vertex is shifted up 2 units, opens down



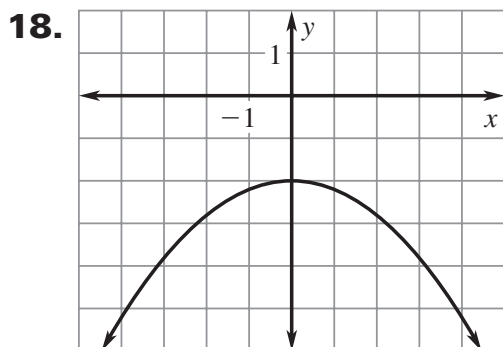
same axis of symmetry, vertex is shifted down 5 units, opens down, and is narrower



same axis of symmetry, vertex is shifted down 5 units, opens up, and is wider

Answers for 4.1 *continued*

For use with pages 240–243

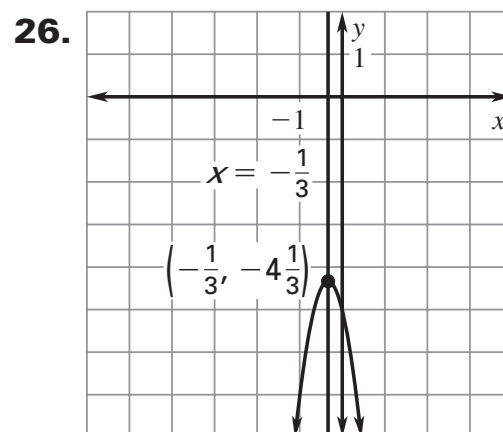
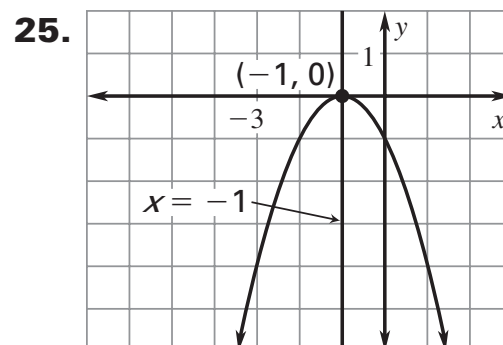
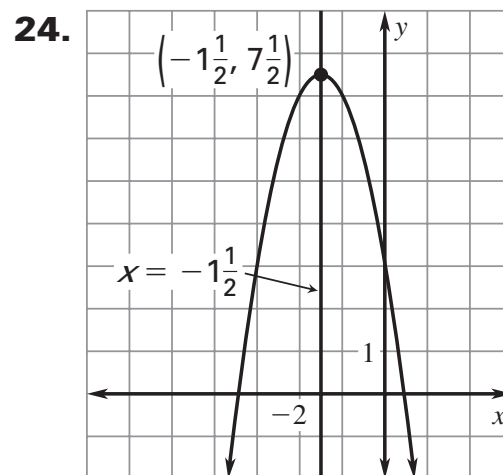
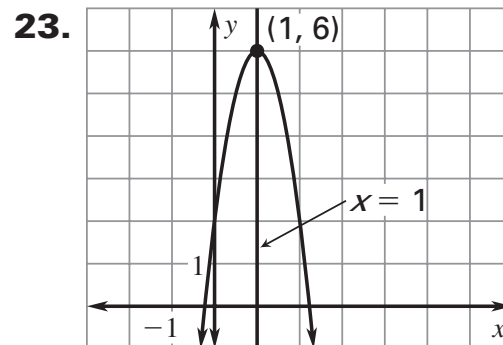
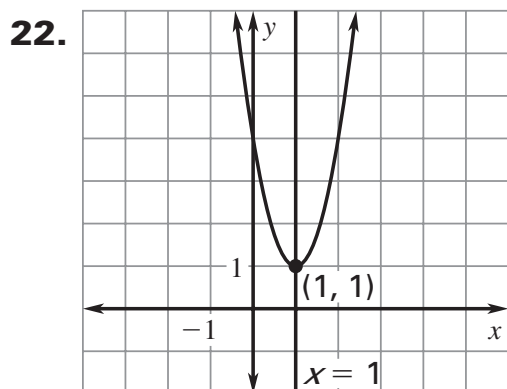
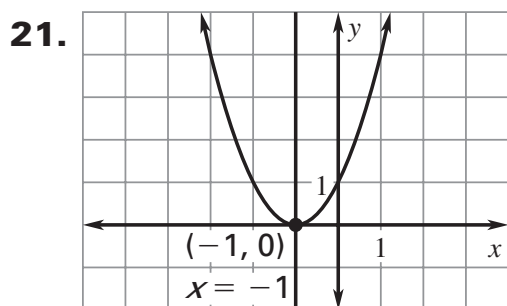


same axis of symmetry, vertex is shifted down 2 units, opens down, and is wider

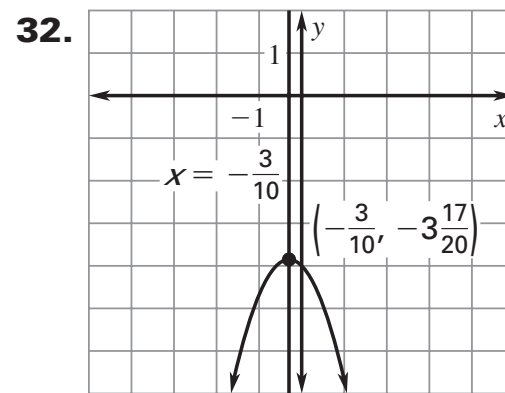
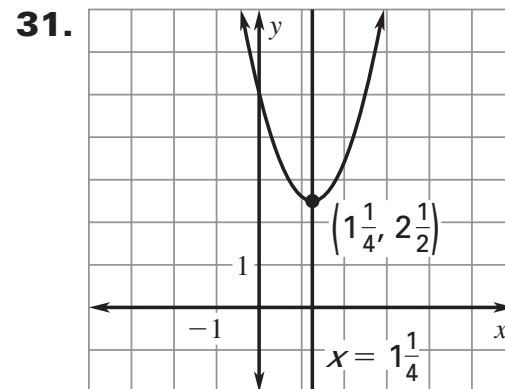
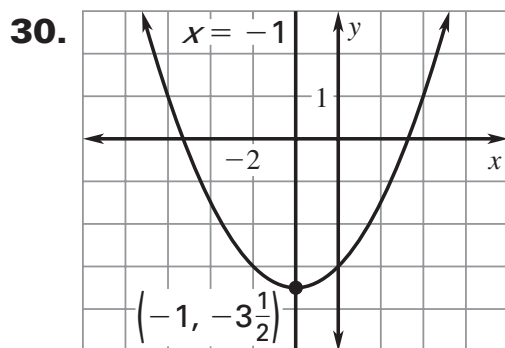
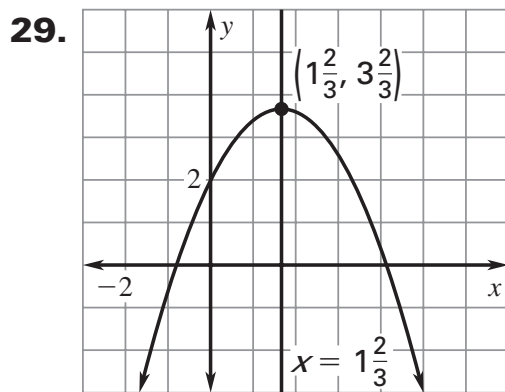
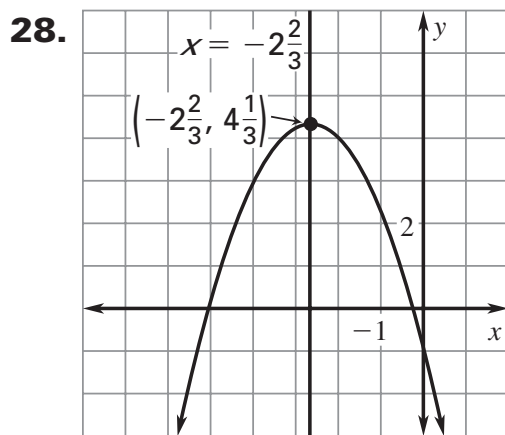
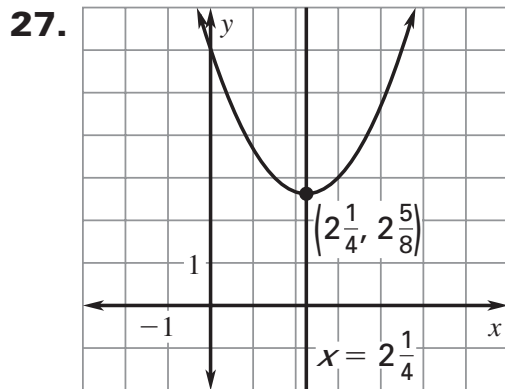
- 19.** The formula for the x -coordinate of the vertex is

$$-\frac{b}{2a}; \quad -\frac{24}{2(4)} = -3.$$

- 20.** $c = -7$; The y -intercept of the graph is the value of c , which is -7 .



Answers for 4.1 *continued*
For use with pages 240–243



33. maximum value; -1

34. minimum value; 7

35. minimum value; -1

36. maximum value; 22

37. minimum value; -2

38. maximum value; 51

39. D **40.** C

41. $a = -0.02, b = 1, c = 6$

42. $a = -0.01, b = 0.7, c = 6$

43. *Sample answer:*

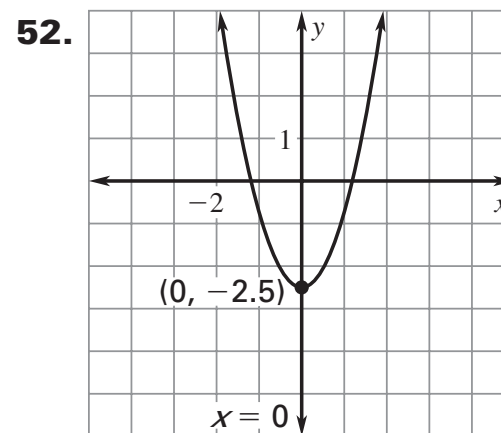
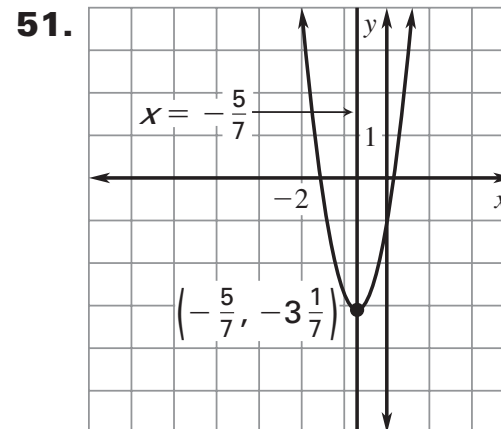
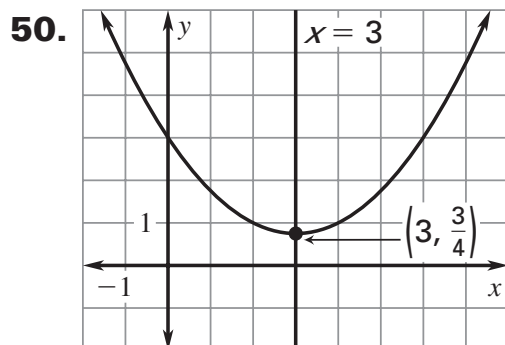
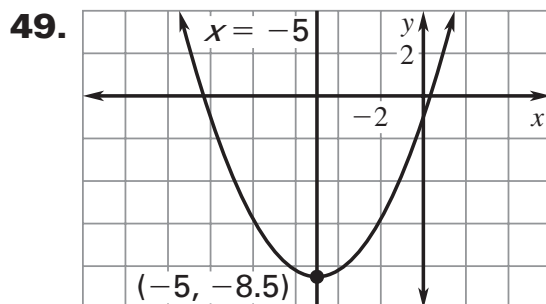
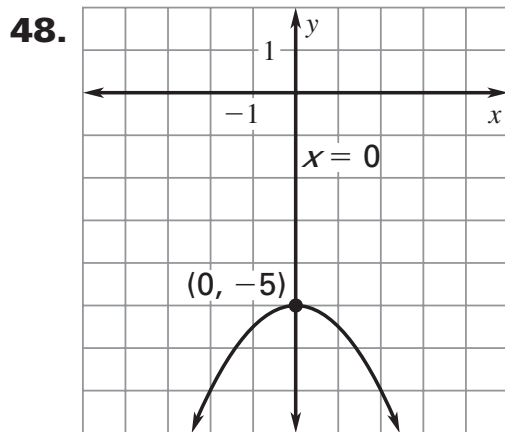
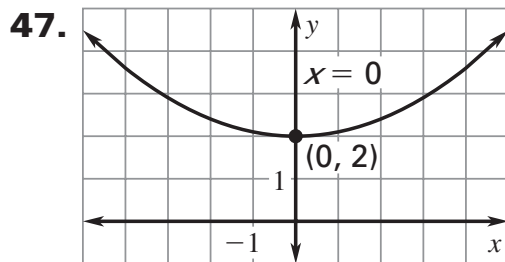
$$y = -x^2 + 8x + 3,$$

$$y = 2x^2 - 16x - 1,$$

$$y = x^2 - 8x - 6$$

Answers for 4.1 *continued*
For use with pages 240–243

44. C 45. A 46. B



53. The axis of symmetry has to lie half way between the two x -coordinates; $x = -1$.

54. The y -coordinate of the vertex is obtained by substituting the x -coordinate of the vertex, $-\frac{b}{2a}$, into the equation for x . So,

$$\begin{aligned} y &= a\left(-\frac{b}{2a}\right)^2 + b\left(-\frac{b}{2a}\right) + c \\ &= \frac{ab^2}{4a^2} - \frac{b^2}{2a} + c \\ &= \frac{b^2}{4a} - \frac{2b^2}{4a} + c = -\frac{b^2}{4a} + c. \end{aligned}$$

Answers for 4.1 *continued*

For use with pages 240–243

4.1 Problem Solving

55. Raise the price by \$.75 to increase revenue to \$4900 per day.

56. $R(x) = (320 - 20x)(70 + 5x)$; decrease the price by \$20 to maximize revenue at \$22,500 per month.

57. about 10 ft

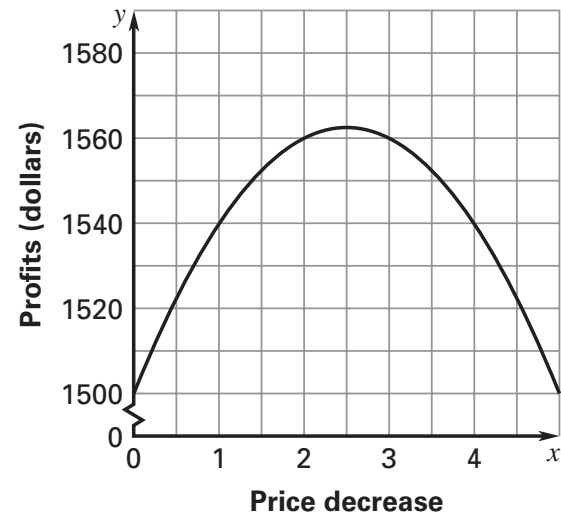
58. No; the maximum height the mouse will jump is about 2.1 feet.

59. a. profit = price • sales – expenses; $P(x) = (20 - x)(150 + 10x) - 1500$

b.

x	$P(x)$
0	1500
1	1540
2	1560
3	1560
4	1540
5	1500

c.



Reduce the price by \$2.50 to increase profits to \$1562.50 per week.

60. a. Earth: $\frac{-32}{10,000}x^2 + x$,

moon: $\frac{-5.3}{10,000}x^2 + x$

b. 312.5 ft; about 1887 ft

c. The ratio of the distance traveled on the moon to the distance traveled on Earth is about 6.04 to 1. The ratio of the gravity of the moon to the gravity of Earth is about 1 to 6.04. So, as the gravity increases the distance traveled decreases proportionally.

61. $\frac{p^2}{8}$

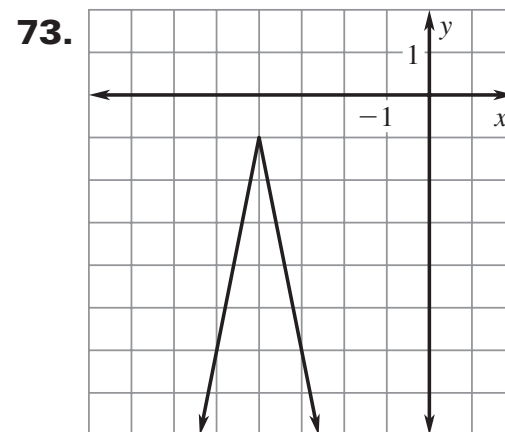
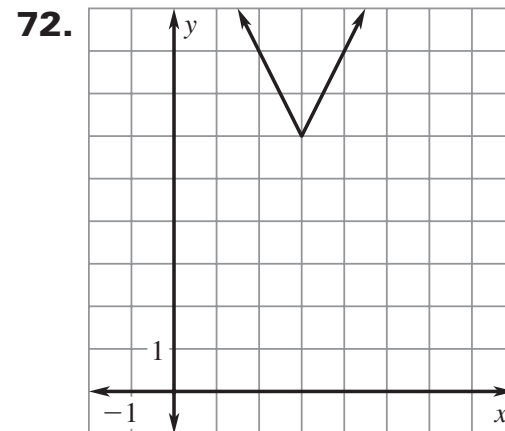
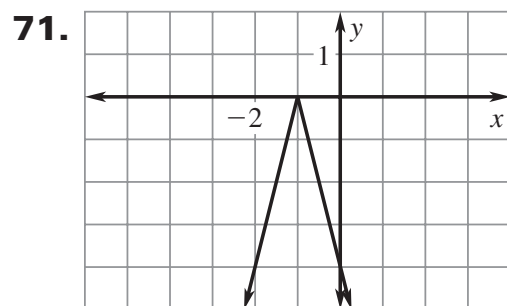
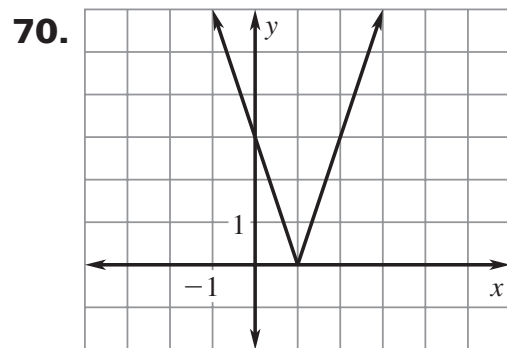
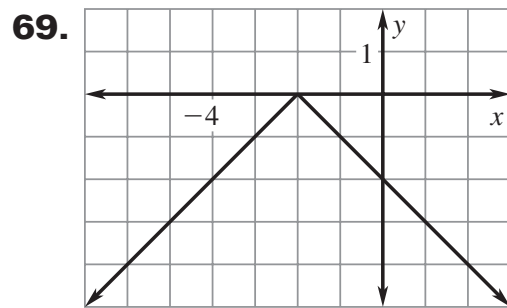
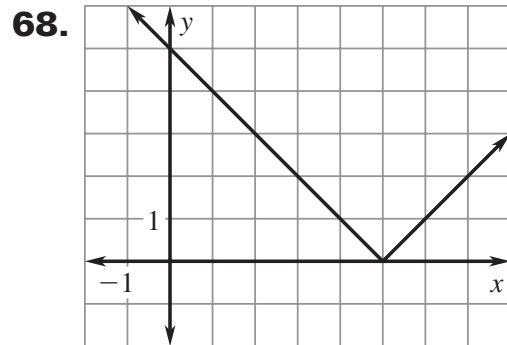
Answers for 4.1 *continued*

For use with pages 240–243

4.1 Mixed Review

62. 3 63. $-1\frac{1}{3}$ 64. $2\frac{2}{5}$

65. 2 66. -10 67. $-5\frac{5}{9}$



74. 54 mi/h