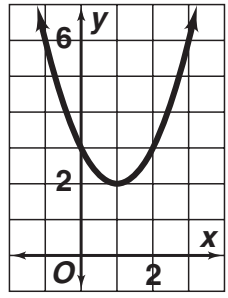
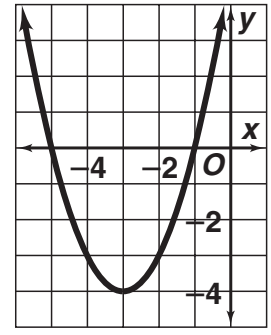
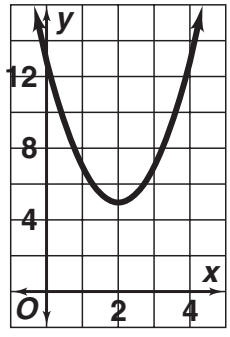
Answers for Lesson 5-3 Exercises

1. 

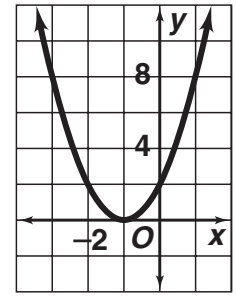
$x = 1$

2. 

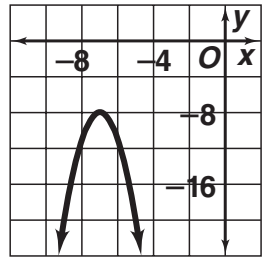
$x = -3$

3. 

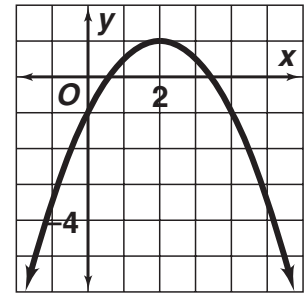
$x = 2$

4. 

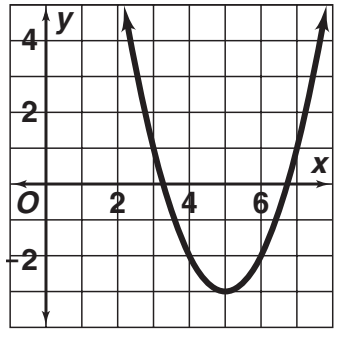
$x = -1$

5. 

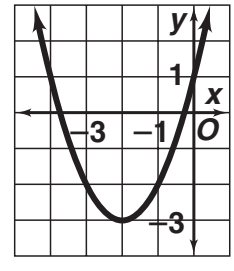
$x = -7$

6. 

$x = 2$

7. 

$x = 5$

8. 

$x = -2$

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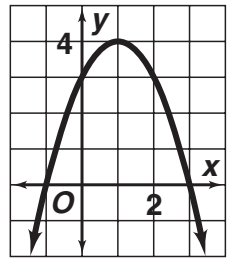
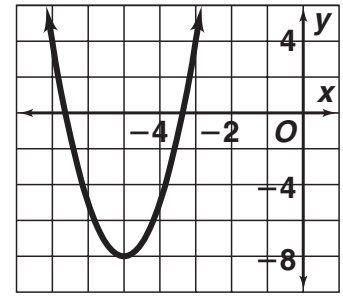
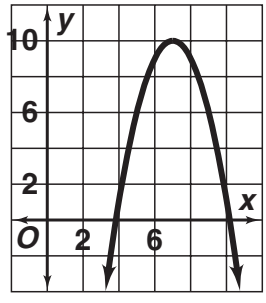
9. 

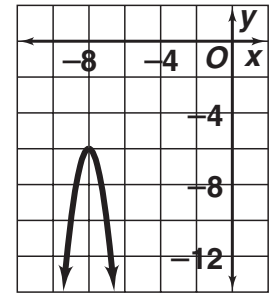
$x = 1$

10. 

$x = -5$

11. 

$x = 7$

12. 

$x = -8$

13. $y = \frac{1}{4}x^2$

14. $y = -x^2 + 4$

15. $y = -(x - 2)^2$

16. $y = -(x + 2)^2$

17. $y = (x - 2)^2$

18. $y = -2x^2$

19. $y = 6(x + 3)^2 - 2$

20. $y = -(x - 1)^2 + 2$

21. $(-20, 0), -600$

22. $(3.2, 0), 1.024$

23. $(-5.5, 0), 726$

24. $(-1, -1), -0.9965$

25. $(4, -25), -41$

26. $(125, 125), 15{,}750$

27. $y = (x - 2)^2 + 2$

28. $y = (x + 1)^2 + 4$

29. $y = 6x^2 - 10$

30. $y = -5x^2 + 12$

31. $y = 4\left(x + \frac{7}{8}\right)^2 - \frac{49}{16}$

32. $y = 2\left(x + \frac{1}{4}\right)^2 - \frac{1}{8}$

33. $y = 4\left(x - \frac{5}{4}\right)^2 + \frac{71}{8}$

34. $y = -2(x - 2)^2 + 11$

35. $y = \frac{9}{4}\left(x + \frac{2}{3}\right)^2 - 2$

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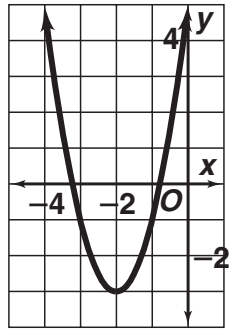
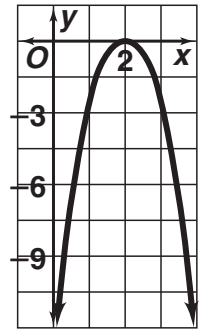
36.



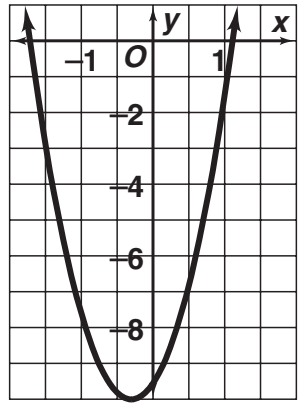
$x = -2$

37.



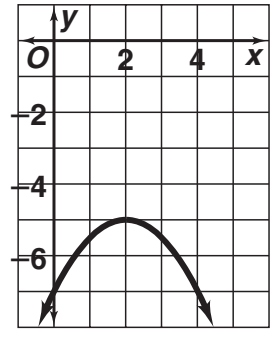
$x = 2$

38.



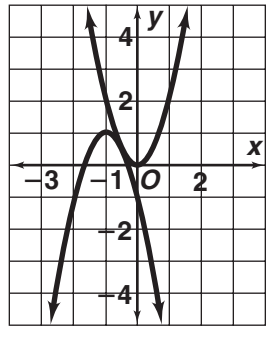
$x = -0.3$

39.

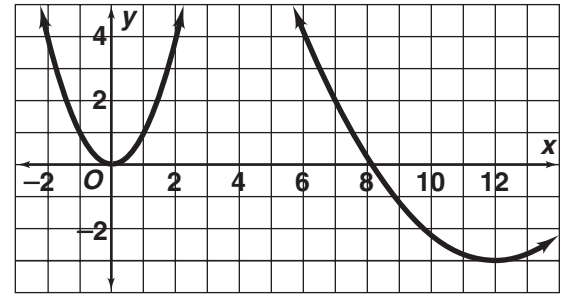


$x = 2$

40.



41.



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42. **a.** All nonnegative numbers; a price cannot be negative; it would imply that the bakery pays people to take bread.

b. \$277.50; \$210.00

c. \$0.55

d. \$300.00

43. $y = -7(x - 1)^2 + 2$

44. $y = -\frac{4}{9}(x - 3)^2 + 6$

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

46. $y = \frac{3}{2}(x + 2)^2 + 6$

47. $y = 7(x + 1)^2 - 4$

48. $y = -7x^2 + 5$

49. $y = -10\left(x - \frac{1}{10}\right)^2 - \frac{9}{10}$

50. $y = 8\left(x - \frac{1}{4}\right)^2 - \frac{3}{2}$

51. $y = 25x^2 + 60x + 27$

52. $y = -9x^2 + 24x - 10$

53. $y = 2x^2 + 22x$

54. $y = \frac{1}{2}x^2 - 5x + \frac{35}{2}$

55. $y = -10x^2 - 40x - 40$

56. $y = 16x^2 - 8x + 2$

57. **a.** first: $x = 4$, second: $x = 2.5$

b. For the first spreadsheet the x_1-values 3 and 5 are equidistant from 4 and their y_1-values are both -3. In the second spreadsheet, the x_2-values 2 and 3 are equidistant from 2.5 and their y_2-values are both 2.

c. $y = -4(x - 4)^2 + 1$; $y = 4\left(x - \frac{5}{2}\right)^2 + 1$

58. Each function of the family has (3, 4) as the vertex and $x = 3$ as the line of symmetry. Functions in the family have different stretch factors. So the equation for the family is $fx = a(x - 3)^2 + 4$, where a is any real number.

59. yes

60. yes

61. no; $y = -3\left(x + \frac{1}{3}\right)^2 + \frac{4}{3}$

62. yes

63. no; $y = (x + 1)^2 + 7$

64. yes

65. no; $y = -4\left(x - \frac{3}{4}\right)^2 + \frac{21}{4}$

66. yes

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67. no; $y = 100\left(x - \frac{1}{5}\right)^2 + 6$

68. Any real numbers a and k such that $a + k = 1$ will work. However, if $a = 0$ and $k = 1$, the function will be linear rather than quadratic.

69. $a = 3, k = -1$

70. $a = -6, k = 35$

71. $a = \frac{1}{5}, k = 1$

72. $a = -\frac{22}{3}, k = \frac{74}{3}$

73. $a = 1, k = -650$

74. A

75. Check students' work.

76. minimum; 150

77. Answers may vary. Sample: The graph of $y = (x - 6)^2 + 7$ is the graph of $y = (x + 6)^2$ translated right 12 units and up 7 units.

78. **a.** $ah^2 + k$

b. $h = 0$ or $a = 0$ (Note, however, that if $a = 0$, the function will not be quadratic.)

79. $y = \frac{1}{4}x^2$

80. $y = \frac{1}{2}(x + 3)^2$

81. $y = -\frac{1}{4}(x - 3)^2$

82. $y = -\frac{1}{4}(x - 4)^2$

83. $y = 2(x - 1)^2$

84. $y = -4(x + 3)^2$

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