Use a table of values to graph each equation. State the domain and range. (Lesson 9-1)

1–4. See Ch. 9 Answer Appendix.

1. $y = x^2 + 3x + 1$

2. $y = 2x^2 - 4x + 3$

3. $y = -x^2 - 3x - 3$

4. $y = -3x^2 - x + 1$

Consider $y = x^2 - 5x + 4$. (Lesson 9-1)

5. Write the equation of the axis of symmetry. **$x = 2.5$**

6. Find the coordinates of the vertex. Is it a maximum or minimum point? **(2.5, −2.25); minimum**

7. Graph the function. **See margin.**

8. **SOCCER** A soccer ball is kicked from ground level with an initial upward velocity of 90 feet per second. The equation $h = -16t^2 + 90t$ gives the height h of the ball after t seconds. (Lesson 9-1)

   a. What is the height of the ball after one second? **74 ft**

   b. How many seconds will it take for the ball to reach its maximum height? **2.8125 s**

   c. When is the height of the ball 0 feet? What do these points represent in this situation?
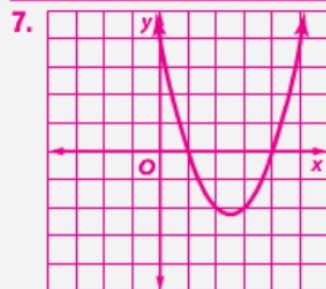
15. **PARTIES** Della's parents are throwing a Sweet 16 party for her. At 10:00, a ball will slide 25 feet down a pole and light up. A function that models the drop is $h = -t^2 + 5t + 25$, where h is height in feet of the ball after t seconds. How many seconds will it take for the ball to reach the bottom of the pole? (Lesson 9-2) **≈8.1 s**

25 ft
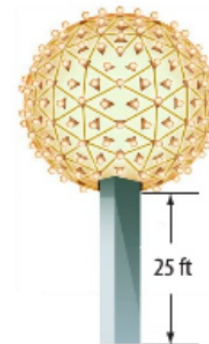
Describe how the graph of each function is related to the graph of $f(x) = x^2$. (Lesson 9-3)

16. $g(x) = x^2 + 3$ **translated up 3 units**

17. $h(x) = 2x^2$ **stretched vertically**

18. $g(x) = x^2 - 6$ **translated down 6 units**

19. $h(x) = \frac{1}{5}x^2$ **compressed vertically**

20. $g(x) = -x^2 + 1$ **reflected over x-axis and translated up 1 unit**

21. $h(x) = -\frac{5}{8}x^2$ **reflected over x-axis and compressed vertically**

22. **MULTIPLE CHOICE** Which is an equation for the function shown in the graph? (Lesson 9-3) **D**
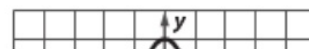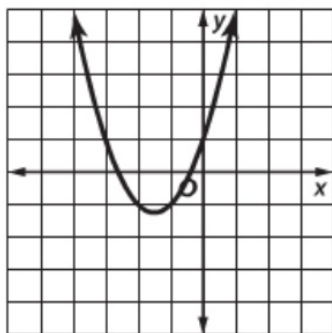
8c. $t = 0$, $t = 5.62$ Before the ball is kicked, and when the ball hits the ground after the kick.

Additional Answer

7.

Mid-Chapter Quiz

1.

x	y
−3	1
−2	−1
−1	−1
0	1
1	5
2	11

D = {all real numbers}
R = {y | y ≥ −1.25}

2.

x	y
−3	33
−2	19
−1	9
0	3
1	1
2	3
3	9
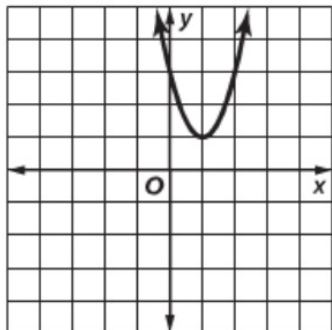
D = {all real numbers}
R = {y | y ≥ 1}

3.

x	y
−3	−3
−2	−1
−1	−1
0	−3
1	−7
2	−13
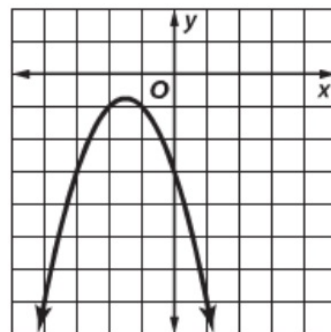
D = {all real numbers}
R = {y | y ≤ −0.75}

4.

x	y
−3	−23
−2	−9
−1	−1
0	1
1	−3
2	−13
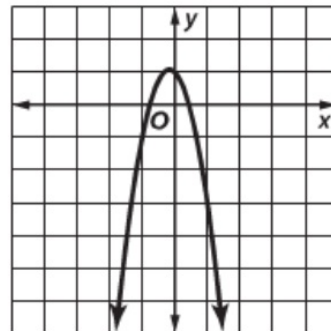
D = {all real numbers}
R = $\left\{y \mid y \le 1\frac{1}{12}\right\}$

maximum height? **2.8125 s**

c. When is the height of the ball 0 feet? What do these points represent in this situation?

Solve each equation by graphing. If integral roots cannot be found, estimate the roots to the nearest tenth. (Lesson 9-2)

9. $x^2 + 5x + 6 = 0$ **−3, −2**

10. $x^2 + 8 = -6x$ **−4, −2**

11. $-x^2 + 3x - 1 = 0$ **0.4, 2.6**

12. $x^2 = 12$ **−3.5, 3.5**

8c. $t = 0$, $t = 5.625$; Before the ball is kicked, and when the ball hits the ground after the kick.

13. **BASEBALL** Juan hits a baseball. The equation $h = -16t^2 + 120t$ models the height h, in feet, of the ball after t seconds. How long is the ball in the air? (Lesson 9-2) **7.5 s**

14. **CONSTRUCTION** Christopher is repairing the roof on a shed. He accidentally dropped a box of nails from a height of 14 feet. This is represented by the equation $h = -16t^2 + 14$, where h is the height in feet and t is the time in seconds. Describe how the graph is related to $h = t^2$. (Lesson 9-3) **compressed vertically and shifted up 14 units**

22. **MULTIPLE CHOICE** Which is an equation for the function shown in the graph? (Lesson 9-3) **D**
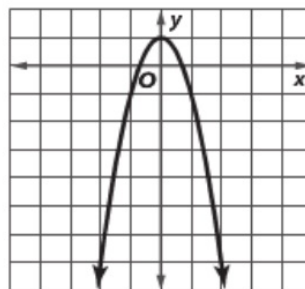
A $y = -2x^2$

B $y = 2x^2 + 1$

C $y = x^2 - 1$

D $y = -2x^2 + 1$

Solve each equation by completing the square. Round to the nearest tenth. (Lesson 9-4)

23. $x^2 + 4x + 2 = 0$ **−3.4, −0.6**

24. $x^2 - 2x - 10 = 0$ **−2.3, 4.3**

25. $2x^2 + 4x - 5 = 7$ **−3.6, 1.6**