

Intermediate Algebra Chapter 11 Review

Solve the given equations by completing the square.

1. $x^2 - 4x + 1 = 0$

2. $2x^2 + 3x - 4 = 0$

Solve the given equations by the method of your choice. Show all steps in an organized and logical fashion. Give exact answers in simplified form.

3. $3x^2 - 10 = 65$

4. $2x^2 + 10 = -8$

5. $(2x - 3)^2 - 7 = 0$

6. $x^2 + 2x = 8$

7. $2x^2 = 5x + 3$

8. $2x^2 + 7x = -1$

9. $1 + \frac{3}{x} = -\frac{1}{x^2}$

10. $3x^2 - 2x + 4 = 0$

11. $x^2 + x + 1 = 0$

12. $x^4 + 5x^2 = 36$

13. $x - 6\sqrt{x} = 7$

14. $x^{\frac{2}{3}} - x^{\frac{1}{3}} - 12 = 0$

15. $(x - 1)^2 + (x - 1) + 1 = 0$

Graph the given quadratic functions. For each function, find the vertex and the intercepts. Graph the quadratic by using the vertex, intercepts and other points as needed.

16. $f(x) = x^2 - 4$

17. $f(x) = (x - 1)^2 + 2$

18. $f(x) = -(x + 2)^2 - 4$

19. $f(x) = x^2 + 2x - 8$

20. $f(x) = 2x^2 - 5x - 3$

21. $f(x) = x^2 + 2x + 2$

Solve each inequality. Show all steps in an organized and logical fashion. Write the solution in interval form.

22. $2x^2 - 5x - 3 \leq 0$

23. $x^2 - 9 \geq 0$

24. $9x^2 + 3x - 2 > 0$

25. $\frac{x + 5}{x + 2} < 0$

26. $\frac{x + 1}{x + 3} < 2$

For each of the following problems, follow directions given in the problem.

27. For each of a-d, find a quadratic equation that has the given solutions.

Write the quadratic equation in the form $ax^2 + bx + c = 0$.

a. $4, -5$

b. $\sqrt{3}, -\sqrt{3}$

c. $3i, -3i$

d. $\frac{1}{2}, -\frac{2}{5}$

28. For each quadratic equation, compute the discriminant. Use the discriminant to determine the number and kinds of solutions.

a. $2x^2 - 4x - 3 = 0$

b. $x^2 = 2x - 6$

c. $x^2 = 6x - 9$

In the following problems, use your calculator where appropriate.

29. Use your calculator to approximate the solutions of the following quadratic equations, correct to the nearest tenth.

a. $4x^2 - x - 1 = 0$

b. $1.25x^2 - .75x - 3.25 = 0$

c. $\frac{2}{3}x^2 + \frac{1}{5}x - 7 = 0$

30. Use your calculator to approximate the maximum or minimum value for each of the following quadratic functions to the nearest tenth.

a. $f(x) = x^2 - 4.2x + 8.1$

b. $f(x) = 2.1x^2 + 6.5x - 3.1$

c. $f(x) = 3.4x^2 - 4.1x + 1$

For each application problem, use your graphing calculator to graph the function. Then use the graph to answer the question. If the answer is not an integer, round it to the nearest tenth.

31. (11.3, #59) A person standing close to the edge on the top of a 160-foot building throws a baseball vertically upward. The quadratic function

$$s(t) = -16t^2 + 64t + 160$$

models the ball's height above the ground, $s(t)$, in feet, t seconds after it was thrown.

- After how many seconds does the ball reach its maximum height? What is the maximum height?
- How many seconds does it take until the ball finally hits the ground?
- Find $s(0)$ and describe what it means.

32. For this application problem, set up an equation and solve it showing all steps. You may use your calculator to approximate the solution only after you have gotten an exact answer. Round the answer to the nearest tenth. A rectangular park is 4 miles long and 2 miles wide. How long is a pedestrian path that runs diagonally across the park?

33. The quadratic function

$$f(x) = -0.018x^2 + 1.93x - 25.34$$

describes the miles per gallon of a Ford Taurus driven at x miles per hour. Suppose you own a Ford Taurus. At what speed should you drive to maximize the miles per gallon?

34. In 2 years, an investment of \$2500 grows to \$2916. Use the compound interest formula

$$A = P(1+r)^t$$

to find the annual interest rate, r .

35. A baseball is hit by a batter. The function

$$s(t) = -16t^2 + 140t + 3$$

models the ball's height above the ground, $s(t)$, in feet, t seconds after it was hit. How long will it take for the ball to strike the ground?

36. The function

$$H(x) = \frac{15}{8}x^2 - 30x + 200$$

models heart rate, $H(x)$, in beats per minute, x minutes after a strenuous workout.

- What is the heart rate immediately following the workout?
- According to the model, during which intervals of time after the strenuous workout does the heart rate exceed 110 beats per minute? For which of those intervals has model breakdown occurred? Which interval provides a more realistic answer? How did you determine this?

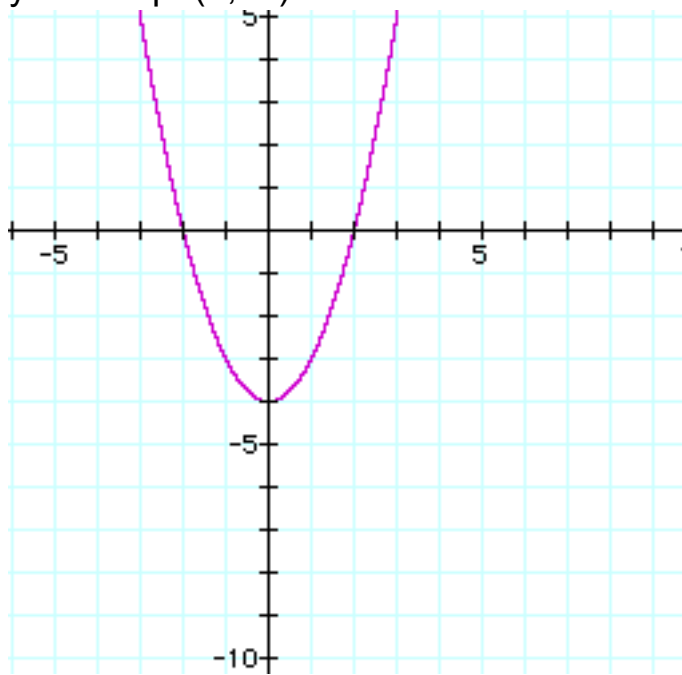
Answers:

1. $\{2 + \sqrt{3}, 2 - \sqrt{3}\}$	22. $\left[-\frac{1}{2}, 3\right]$
2. $\left\{\frac{-3 + \sqrt{41}}{4}, \frac{-3 - \sqrt{41}}{4}\right\}$	23. $(-\infty, -3] \cup [3, \infty)$
3. $\{-5, 5\}$	24. $\left(-\infty, -\frac{2}{3}\right) \cup \left(\frac{1}{3}, \infty\right)$
4. $\{-3i, 3i\}$	25. $(-5, -2)$
5. $\left\{\frac{3 + \sqrt{7}}{2}, \frac{3 - \sqrt{7}}{2}\right\}$	26. $(-\infty, -5) \cup (-3, \infty)$
6. $\{-4, 2\}$	27a. $x^2 + x - 20 = 0$, 27b. $x^2 - 3 = 0$ 27c. $x^2 + 9 = 0$, 27d. $10x^2 + x - 2 = 0$
7. $\left\{-\frac{1}{2}, 3\right\}$	28a. $D = 40$, two real sol'ns 28b. $D = -20$, two complex sol'ns 28c. $D = 0$, one real sol'n
8. $\left\{\frac{-7 + \sqrt{41}}{4}, \frac{-7 - \sqrt{41}}{4}\right\}$	29a. $\{-0.4, 0.6\}$, 29b. $\{-1.3, 1.9\}$ 29c. $\{-3.4, 3.1\}$
9. $\left\{\frac{-3 + \sqrt{5}}{2}, \frac{-3 - \sqrt{5}}{2}\right\}$	30a. $(2.1, 3.7)$ OR Min is 3.7 30b. $(-1.5, -8.1)$ OR Min is -8.1 30c. $(0.6, -0.2)$ OR Min is -0.2
10. $\left\{\frac{1 + i\sqrt{11}}{3}, \frac{1 - i\sqrt{11}}{3}\right\}$	31a. 2 seconds, 224 ft. 31b. 5.7 sec 31c. $s(0) = 160$, The height at $t = 0$ is 160 feet.
11. $\left\{\frac{-1 + i\sqrt{3}}{2}, \frac{-1 - i\sqrt{3}}{2}\right\}$	32. 4.5 miles 33. 54 mph
12. $\{-2, 2, -3i, 3i\}$	34. 8%
13. $\{49\}$	35. about 8.8 seconds
14. $\{-27, 64\}$	36a. 200 bpm
15. $\left\{\frac{1 + i\sqrt{3}}{2}, \frac{1 - i\sqrt{3}}{2}\right\}$	36b. $[0, 4] \cup [12, \infty)$ Model breaks down on the second interval. The heart rate would not start rising after 12 minutes.

16. $V(0,-4)$

x-intercepts $(-2,0)$ and $(2,0)$

y-intercept $(0,-4)$

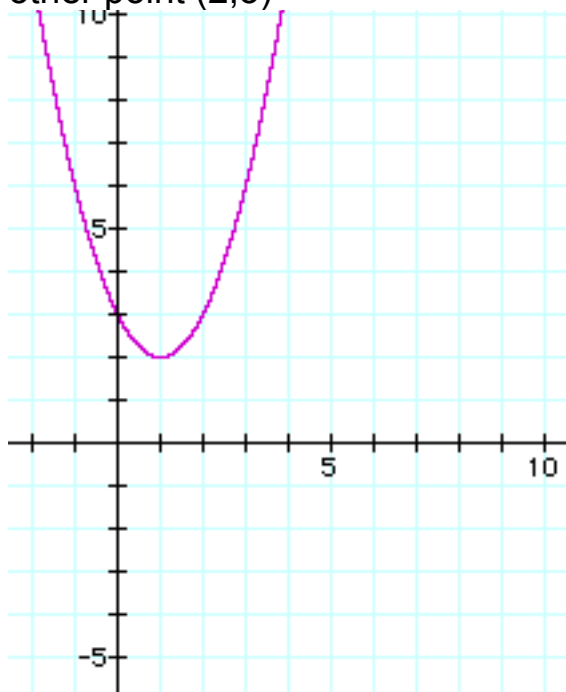


17. $V(1,2)$

x-intercept none

y-intercept $(0,3)$

other point $(2,3)$



18. $V(-2,-4)$

x-intercept none

y-intercept $(0,-8)$

other point $(-4,-8)$



19. $V(-1,-9)$

x-intercept $(-4,0)$ and $(2,0)$

y-intercept $(0,-8)$

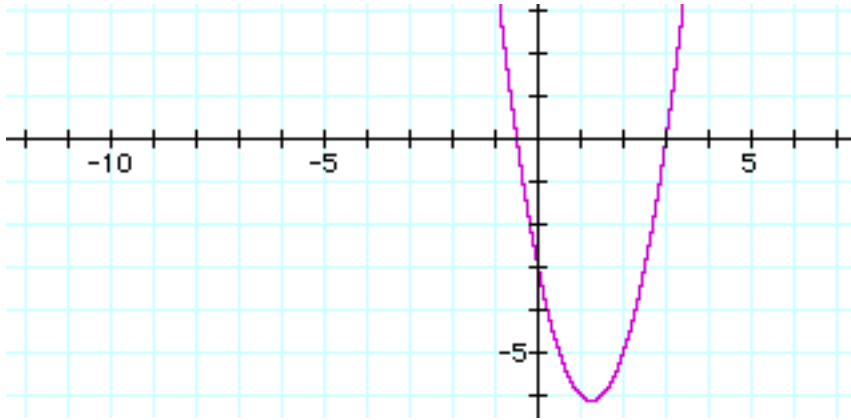


20.

$$V\left(\frac{5}{4}, -\frac{49}{8}\right)$$

x-intercept $\left(-\frac{1}{2}, 0\right)$ $(3, 0)$

y-intercept $(0, -3)$



21. $V(-1, 1)$

x-intercept none

y-intercept $(0, 2)$

other point $(-2, 2)$

