

Chapter 8

Exercise Set 8.1

Solve the quadratic equation by factoring. Solve the same equation by using the quadratic formula to check your answers.

1. $x^2 - 5x + 6 = 0$

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

3. $x^2 + 7x + 12 = 0$

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

5. $x^2 + 5x - 14 = 0$

6. $x^2 = 4x + 12$

7. $2x^2 + 5x - 3 = 0$

8. $3x^2 - x - 2 = 0$

Use the discriminant of the given quadratic equation to determine how many real number solutions it has. If it has real solutions, use the quadratic formula to find them.

9. $x^2 + 2x - 5 = 0$

10. $x^2 - 3x = 1$

11. $x^2 + 8 = 0$

12. $x^2 - 6x + 9 = 0$

13. $x^2 + 6x + 1 = 0$

14. $x^2 - 6x + 4 = 0$

15. $2x^2 + 4x + 2 = 0$

16. $2x^2 = 3x + 5$

17. $3x^2 - 2x + 1 = 0$

18. $3x^2 = 6x - 9$

Solve the given quadratic equation by finding all its real number solutions.

21. $x^2 + x - 6 = 0$

22. $x^2 - 8x + 15 = 0$

23. $x^2 + 11x + 28 = 0$

24. $(x-1)^2 - 4 = 0$

25. $x^2 + 3x + 1 = 0$

26. $2x^2 + x - 3 = 0$

27. $2x^2 - 16 = 0$

28. $4x^2 - 4x - 15 = 0$

29. $\left(x + \frac{1}{2}\right)^2 = 1$

30. $x^2 - 2x + 2 = 0$

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

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

$$33. (x-5)^2 = 2$$

$$34. x^2 + 8 = 0$$

$$35. x^2 = 6x - 9$$

$$36. 3x^2 - 13x - 10 = 0$$

$$37. \left(x - \frac{3}{2}\right)^2 - \frac{1}{4} = 0$$

$$38. x^2 + x = 2$$

$$39. 3x^2 - 5x - 1 = 0$$

$$40. 2x^2 - x - \frac{1}{2} = 0$$

$$41. 4x^2 - x - 5 = 0$$

$$42. 4(x+1)^2 = 3$$

$$43. (x+2)^2 + 4 = 0$$

$$44. x^2 - 2x - 35 = 0$$

Exercise Set 8.2

Complete the square for the given quadratic expression

1. $x^2 + 2x$

2. $x^2 - 4x$

3. $x^2 + 5x$

4. $x^2 - 7x$

5. $x^2 - x$

6. $2x^2 + 12x$

7. $3x^2 - 12x$

8. $3x^2 + 9x$

9. $4x^2 + 24x$

10. $2x^2 + x$

11. $2x^2 - 5x$

12. $3x^2 - 2x$

13. $-x^2 + 4x$

14. $-2x^2 + 3x$

Solve the given quadratic equation by completing the square

15. $x^2 + 2x = 0$

16. $x^2 - x = 0$

17. $x^2 - 2x - 3 = 0$

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

19. $x^2 + 6x + 4 = 0$

20. $2x^2 - 4x - 1 = 0$

21. $4x^2 - 4x - 3 = 0$

22. $x^2 - 4x - 2 = 0$

23. $2x^2 + 8x + 1 = 0$

24. $3x^2 - 6x - 1 = 0$

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

26. $4x^2 - 3x - 4 = 0$

27. $x^2 + 2x + 5 = 0$

28. $(x+3)(x-1) = 1$

29. $4x^2 - 4x + 1 = 0$

30. $(x-2)(x+4) = -7$

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

32. $x^2 + 5x + 5 = 0$

Exercise Set 8.3

A quadratic function in vertex form is given in exercises 1-12. In each case:

- (a) Find its vertex and its maximum or minimum value.
- (b) Find its x - and y -intercepts.
- (c) Sketch its graph. Place the coordinates of the points corresponding to the vertex and the intercepts on the graph.

1. $y = (x+2)^2 - 9$

2. $y = (x-5)^2 - 4$

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

4. $y = 2(x-3)^2 - 8$

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

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

7. $y = -2(x+1)^2 + 5$

8. $y = -(x-4)^2 - 1$

9. $y = -\frac{1}{2}\left(x + \frac{3}{2}\right)^2 + \frac{15}{8}$

10. $y = \left(x - \frac{5}{2}\right)^2 - \frac{9}{4}$

11. $y = 4(x+1)^2 - 8$

12. $y = \frac{1}{2}\left(x - \frac{3}{2}\right)^2 - \frac{25}{8}$

A quadratic function is given in exercises 13-24. In each case:

- (a) Write its equation in vertex form by completing the square.
- (b) Find its vertex and its maximum or minimum value.
- (c) Find its x - and y -intercepts.
- (d) Sketch its graph. Place the coordinates of the points corresponding to the vertex and the intercepts on the graph.

13. $y = x^2 + 4x$

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

15. $y = -x^2 + 10x$

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

17. $y = 3x^2 - 6x - 1$

18. $y = x^2 + x - 1$

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

20. $y = -2x^2 + 8x - 6$

21. $y = -x^2 + 4x - 5$

22. $y = 2x^2 + 6x$

23. $y = x^2 + 2x - 2$

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

Exercise Set 8.4

KYOTE Standards: CA 14

1. The sum of the squares of two consecutive odd integers is 74. Find the two integers.
2. The sum of squares of two consecutive integers is 85. Find the two integers.
3. Two numbers have a sum of 21 and a product of 104. Find the numbers.
4. The length of a rectangular garden is twice its width and its area is 578 square feet. What are the length and width of the garden?
5. One leg of a right triangle is three times longer than its other leg. What are the lengths of the two legs if the hypotenuse is $7\sqrt{10}$ inches long?
6. The hypotenuse of a right triangle is twice as long as one of its legs and the other leg has length $9\sqrt{3}$ centimeters. What is the length of the hypotenuse?
7. One leg of a right triangle is 3 times longer than its other leg. What are the lengths of the two legs and the hypotenuse if the area of the triangle is 96 square inches?
8. A rectangle is 10 meters longer than it is wide and its area is 875 square meters. What are the length and width of the rectangle?
9. A rectangle of length 8 inches and width 5 inches is cut from a square piece of cardboard. If the area of the remaining cardboard is 321 square inches, what is the length of the square piece of cardboard?
10. The length of a rectangle is 2 feet longer than it is wide and its area is 224 square feet. What is its perimeter?
11. A rectangle is 24 feet long. The length of the diagonal between opposite corners of the rectangle is 12 feet more than its width. What is its width?
12. A rectangle has a perimeter of 160 centimeters and an area of 1500 square centimeters. What are the length and width of the rectangle?
13. The length of the diagonal between opposite corners of a rectangle is 20 inches and its length is 4 inches longer than its width. What is the perimeter of the rectangle?
14. The length of the diagonal between opposite corners of a rectangle is twice its width and its length is 27 feet. What is the area of the rectangle?

15. A fence costing \$20 per foot is purchased to enclose a rectangular field whose length is 4 feet longer than its width and whose area is 437 square feet. What is the total cost of the fence?

16. A sail is in the form of a right triangle with the vertical leg 4 feet longer than the horizontal leg and with hypotenuse $4\sqrt{13}$ feet. What is the cost of the material used to make the sail if this material costs \$10 per square foot?