

8.4 The Quadratic Formula

Solving Quadratic Equations
The Discriminant
Quadratic Equations Having Complex Solutions

Key Terms

Use the terms listed below to complete the statement of the Quadratic Formula.

a, b, c

$$\frac{-_ \pm \sqrt{b^2 - 4a_}}{2_}$$

Solving Quadratic Equations

Exercises 1-9: Use the quadratic formula to solve the equation.

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

1. _____

2. $4x^2 - 7x + 1 = 0$

2. _____

3. $2x^2 + 4x = 8$

3. _____

4. $2x^2 - 12x + 18 = 0$

4. _____

5. $\frac{1}{2}x^2 + 8 = 4x$

5. _____

6. $9x^2 + 24x + 16 = 0$

6. _____

7. $5x^2 + 2x + 1 = 0$

7. _____

8. $x^2 + 4 = 0$

8. _____

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

9. _____

10. If a car's headlights do not illuminate the road beyond 600 feet, estimate a safe nighttime speed limit x , in mph, for the car by solving $\frac{1}{9}x^2 + \frac{11}{3}x = 600$. 10. _____

11. If an object is thrown downward with an initial velocity of 32 feet per second from a 300-foot tower, its height h in feet after t seconds is modeled by $h(t) = -16t^2 - 32t + 300$. Estimate when the height of the object is 60 feet. 11. _____

The Discriminant

12. Find the discriminant for the quadratic equation $ax^2 + bx + c = 0$ 12. _____

Exercises 13-15: Use the discriminant to determine the number of real solutions to each quadratic equation. Find all real solutions, if possible, using the quadratic formula.

13. $9x^2 - 12x + 4 = 0$ 13. _____

14. $2x^2 - 5x + 4 = 0$ 14. _____

15. $3x^2 + 5x + 1 = 0$ 15. _____

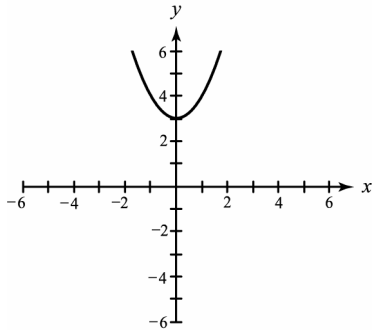
Exercises 16-18: For each problem, the graph of $y = ax^2 + bx + c$ is shown.

(a) State whether $a > 0$ or $a < 0$.

(b) Solve the equation $ax^2 + bx + c = 0$.

(c) Determine whether the discriminant is positive, negative, or zero..

16.

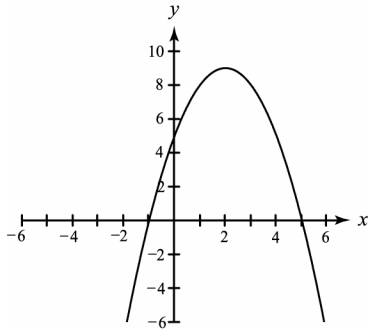


16. (a) _____

(b) _____

(c) _____

17.

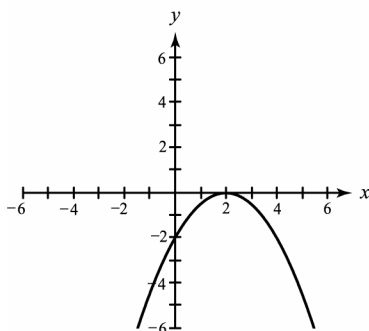


17. (a) _____

(b) _____

(c) _____

18.



18. (a) _____

(b) _____

(c) _____

Quadratic Equations Having Complex Solutions*Exercises 19-21: Solve the equation.*

19. $x^2 + 7 = 0$

19. _____

20. $x^2 + 8 = 0$

20. _____

21. $x^2 + 25 = 0$

21. _____

Exercises 22-27: Use the quadratic formula to solve the equation. Write complex solutions in standard form: $a + bi$.

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

22. _____

23. $2x^2 + x + 4 = 0$

23. _____

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

24. _____

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

25. _____

26. $\frac{2}{3}x^2 + \frac{5}{3} = x$

26. _____

27. $\frac{1}{2}x^2 + 1 = x$

27. _____

Exercises 28-30: Solve the quadratic equation by completing the square. Write complex solutions in standard form: $a + bi$.

28. $x(x-4) = -5$

28. _____

29. $x(x-6) = -25$

29. _____

30. $4x(x+1) = -10$

30. _____