

## 11-3

 NAME \_\_\_\_\_ DATE \_\_\_\_\_  
**Solving Quadratic Equations by  
Using the Quadratic Formula** (Pages 628–633)

You can use the quadratic formula to solve any quadratic equation involving any variable.

<b>The Quadratic Formula</b>	The solutions of a quadratic equation in the form $ax^2 + bx + c = 0$ , where $a \neq 0$ , are given by the formula $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ .
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**EXAMPLE**

Use the quadratic formula to solve  $x^2 - 2x - 5 = 0$ .

In the equation  $x^2 - 2x - 5 = 0$ ,  $a = 1$ ,  $b = -2$ , and  $c = -5$ .

Substitute these values into the quadratic formula.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(1)(-5)}}{2(1)}$$

$$x = \frac{2 \pm \sqrt{4 + 20}}{2}$$

$$x = \frac{2 \pm \sqrt{24}}{2}$$

$$x = \frac{2 + \sqrt{24}}{2} \text{ or } x = \frac{2 - \sqrt{24}}{2}$$

$$x \approx 3.45 \quad x \approx -1.45 \quad \text{Use a calculator.}$$

The solutions are approximately 3.45 and  $-1.45$ .

**PRACTICE**

Solve each equation by using the quadratic formula. Approximate irrational roots to the nearest hundredth.

- |                         |                          |                          |
|-------------------------|--------------------------|--------------------------|
| 1. $x^2 + 6x + 8 = 0$   | 2. $n^2 - 12n + 32 = 0$  | 3. $c^2 + 4c + 8 = 0$    |
| 4. $p^2 + 4p - 1 = 0$   | 5. $d^2 - 2d - 15 = 0$   | 6. $5h^2 + 4h + 4 = 0$   |
| 7. $3e^2 - 6e + 3 = 0$  | 8. $2m^2 + 8m + 2 = 0$   | 9. $g^2 - 3g + 2 = 0$    |
| 10. $4k^2 + 2k + 3 = 0$ | 11. $3f^2 - 11f - 4 = 0$ | 12. $4v^2 + 12v + 9 = 0$ |
| 13. $x^2 - 12x = -27$   | 14. $3x^2 + 6x = 1$      | 15. $3x - 1 = -x^2$      |
| 16. $2x(x + 1) = -5$    | 17. $x^2 = 2(4x - 1)$    | 18. $2(x^2 + 3) = 3x$    |

- 19. Automotive Sales** Mark decided that the price of a car tire is a quadratic function of the radius of the tire. He modeled this using the equation  $p = -r^2 + 36r - 255$ , where  $p$  is the price of the tire in dollars and  $r$  is the radius of the tire in inches. Find the price that the model predicts for a tire of radius 14 inches. Then find the price the model predicts for a tire of radius 16 inches.



- 20. Standardized Test Practice** For a certain quadratic equation, the value of  $b^2 - 4ac$  is  $-8$ . How many real number roots does the equation have?

- A** 3 roots      **B** 2 roots      **C** 1 root      **D** 0 roots

Answers: 1.  $-4, -2$  2.  $4, 8$  3. no real roots 4.  $-4.24, 0.24$  5.  $-3, 5$  6. no real roots 7.  $1, 8$  8.  $-3.73, -0.27$  9.  $1, 2$  10. no real roots 11.  $-\frac{3}{4}, 4$  12.  $-1.5, 13, 3, 9$  13.  $3, 9$  14.  $-2.15, 0.15$  15.  $-3.3, 0.3$  16. no real roots 17.  $0.3, 7.7$  18. none 19. \$65; \$65 20. D