PRACTICE & PROBLEM SOLVING

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Practice Tutorial

Additional Exercises Available Online

UNDERSTAND

9. Look for Relationships How can you use the Quadratic Formula to factor a quadratic equation?

10. Error Analysis Describe and correct the error a student made in solving an equation.

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

$$a = 1, b = -5, c = 5$$

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

$$= \frac{-5 \pm \sqrt{25 - 20}}{2}$$

$$= \frac{-5}{2} \pm \frac{\sqrt{5}}{2}$$

✗

11. Mathematical Connections What does the Quadratic Formula tell you about the graph of a quadratic function?

12. Communicate Precisely Explain your process for choosing a method for solving quadratic equations.

13. Higher Order Thinking Kelsey wants to use the Quadratic Formula to solve the equation $x^4 + 5x^2 - 5 = 0$. Is this possible? If so, describe the steps she should follow.

14. Construct Arguments Explain why the graph of the quadratic function $f(x) = x^2 + x + 5$ crosses the y-axis but does not cross the x-axis.

15. Construct Arguments Sage said that the Quadratic Formula does not always work. Sage used it to solve the equation $x^2 - 3x - 2 = -4$, with $a = 1$, $b = -3$, and $c = -2$. The formula gave $x = \frac{3 \pm \sqrt{17}}{2}$ as the solutions to the equation. When Sage checked, neither one of them satisfied the equation. How could you convince Sage that the Quadratic Formula does always work?

PRACTICE

Use the Quadratic Formula to solve each equation. SEE EXAMPLE 1

16. $x^2 - 10x + 25 = 0$ **17.** $x^2 + 2x + 2 = 0$

18. $5x^2 - 8x + 4 = 0$ **19.** $x^2 + 9x - 1 = 3x - 10$

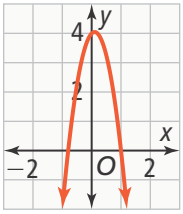
20. $3x^2 - 20x - 7 = 0$ **21.** $-x^2 + 3x - 8 = 0$

Use the discriminant to identify the number and type of solutions for each equation. SEE EXAMPLE 3

22. $25x^2 - 20x + 4 = 0$ **23.** $x^2 + 7x + 11 = 0$

24. $3x^2 - 8x - 10 = 0$ **25.** $2x^2 + 9x + 14 = 0$

Deon throws a ball into the air. The height, h, of the ball, in meters, at time t seconds is modeled by the function $h(t) = -5t^2 + t + 4$. SEE EXAMPLE 4



26. When will the ball hit the ground?

27. Will the ball reach a height of 5 meters?

Use any method to solve the equation. SEE EXAMPLE 2

28. $4x^2 + 7x - 11 = 0$ **29.** $x^2 + 4x + 4 = 100$

30. $3x^2 + x + 7 = x^2 + 10$ **31.** $6x^2 + 2x + 3 = 0$

Find the value(s) of k that will cause the equation to have the given number and type of solutions. SEE EXAMPLE 5

32. $5x^2 + kx + 5 = 0$, 1 real solution

33. $3x^2 + 12x + k = 0$, 2 real solutions

34. $kx^2 - 3x + 4 = 0$, 2 real solutions

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APPLY

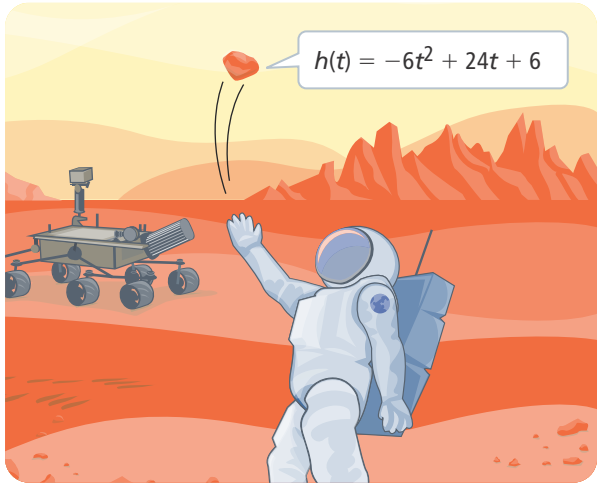
35. Model With Mathematics The table shows the average cost of tuition and fees at a public four-year college for an in-state student in recent years.

Academic Year	Tuition and Fees
2012–13	$9,006
2013–14	$9,077
2014–15	$9,161
2015–16	$9,410

a. Write an equation that can be used to find the average cost, C, of tuition after x years.

b. Use the model to predict when tuition will exceed $10,000.

36. Make Sense and Persevere The first astronaut on Mars tosses a rock straight up. The height, h, measured in feet after t seconds, is given by the function $h(t) = -6t^2 + 24t + 6$.



a. After how many seconds will the rock be 30 feet above the surface?

b. After how many seconds will the rock be 10 feet above the surface?

c. How many seconds will it take for the rock to return to the surface?

d. The same action on Earth is modeled by the equation $g(t) = -16t^2 + 24t + 6$. On Earth, how many seconds would it take for the rock to hit the ground?

ASSESSMENT PRACTICE

37. Which of the following equations has two real solutions? Select *Yes* or *No*.

	Yes	No
a. $x^2 - 8x - 2 = 0$	❑	❑
b. $2x^2 + 10x + 17 = 0$	❑	❑
c. $4x^2 - 28x + 49 = 0$	❑	❑
d. $x^2 + 10x - 25 = 4x + 2$	❑	❑
e. $2x^2 + x + 10 = 5 - 4x - x^2$	❑	❑

38. SAT/ACT Which expression can be simplified to find the solution(s) of the equation $2x^2 - x - 15 = 0$?

Ⓐ $-1 \pm \frac{\sqrt{1 - 4(2)(-15)}}{2(2)}$

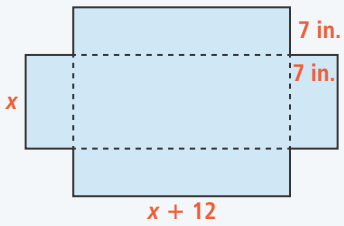
Ⓑ $\frac{1 \pm \sqrt{1 - 4(2)(-15)}}{2(2)}$

Ⓒ $\frac{1 \pm \sqrt{-1 - 4(2)(-15)}}{2(2)}$

Ⓓ $\frac{1 \pm \sqrt{1 - 4(2)(15)}}{2(2)}$

Ⓔ $\frac{1 \pm \sqrt{1 + 4(2)(-15)}}{2(2)}$

39. Performance Task Four congruent squares are cut from a rectangular piece of cardboard.



Part A. If the resulting flaps are folded up and taped together to make a box, write a function to represent the volume of the box in terms of the width of the original piece of cardboard.

Part B. What are the dimensions of the original cardboard, to the nearest tenth, if the volume of the box is 434 in.^{3}

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