



UNDERSTAND

10. **Generalize** Can you write the equation of a quadratic function knowing its zeros and its non-zero y-intercept? If so, describe the process. If not, explain why.
11. **Error Analysis** Describe and correct the error a student made in solving a quadratic equation.

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

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

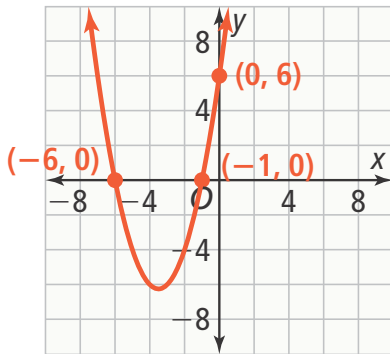
$$0 = 2x(x + 1) + 5(x + 1)$$

$$0 = 2x, 0 = x + 1, 0 \neq 5$$

$$0 = x, -1 = x$$

X

12. **Model With Mathematics** Use the graph of the function to write the equation in factored form.



13. **Generalize** For what values of x is the expression $(x - 4)^2 > 0$?
14. **Error Analysis** A student says that the zeros of $y = (x - 2)(x + 7)$ are -2 and 7 . Is the student correct? If not, describe and correct the error the student made.
15. **Construct Arguments** Explain why $x^2 + 25$ is not equal to $(x + 5)^2$.
16. **Mathematical Connections** Describe how factoring can help you find the x -intercepts of the graph of the quadratic function $y = x^2 - 4x + 3$.

PRACTICE

Factor each quadratic expression. SEE EXAMPLE 1

17. $x^2 - 3x - 10$ 18. $3x^2 - 5x - 12$

19. $x^2 + 15x + 56$ 20. $2x^2 + 7x - 15$

21. $3x^2 - 18x - 48$ 22. $4x^2 - 11x - 3$

23. What are the zeros of the quadratic function $y = 3(x - 5)(x + 4)$? SEE EXAMPLE 2

Solve each quadratic equation. SEE EXAMPLE 3

24. $x^2 - 5x - 14 = 0$ 25. $x^2 = 5x - 6$

26. $3x^2 - 60 = 3x$ 27. $5x^2 + 12x = 9$

28. $4x^2 + 3x - 7 = 0$ 29. $6x^2 = 5x + 6$

30. A penny is dropped from the top of a new building. Its height in feet can be modeled by the equation $y = 256 - 16x^2$, where x is the time in seconds since the penny was dropped. How long does it take for the penny to reach the ground? SEE EXAMPLE 4

Identify the interval(s) on which each quadratic function is positive. SEE EXAMPLE 5

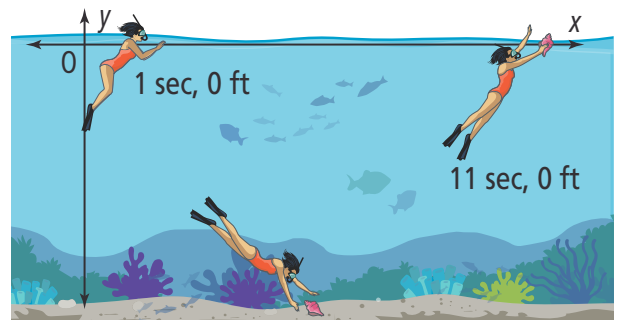
31. $y = x^2 + 9x + 18$ 32. $y = x^2 + 2x - 8$

33. $y = x^2 - 5x - 24$ 34. $y = -x^2 + 4x + 12$

35. $y = 2x^2 + 12x + 18$ 36. $y = 5x^2 - 3x - 8$

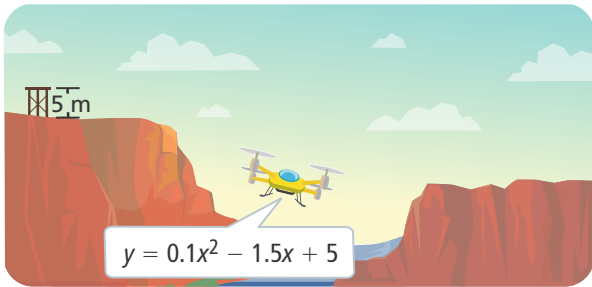
Write an equation for each parabola. SEE EXAMPLE 6

37. A parabola with x -intercepts at $(-1, 0)$ and $(3, 0)$ which passes through the point $(1, -8)$
38. A parabola with x -intercepts at 0 and 1 and which passes through the point $(2, -2)$
39. A snorkeler dives for a shell on a reef. After entering the water, the diver descends $\frac{11}{3}$ ft in one second. Write an equation that models the diver's position with respect to time.



APPLY

- 40. Make Sense and Persevere** Rectangular apartments are 12 ft longer than they are wide. Each apartment has 1,053 ft² of floor space. What are the dimensions of an apartment? Explain.
- 41. Use Structure** The height of a drone, in meters, above its launching platform that is 5 m above the ground, is modeled by $y = 0.1x^2 - 1.5x + 5$, where x is the time in seconds. The drone leaves the launch pad, flies down into a canyon, and then it flies back up again.

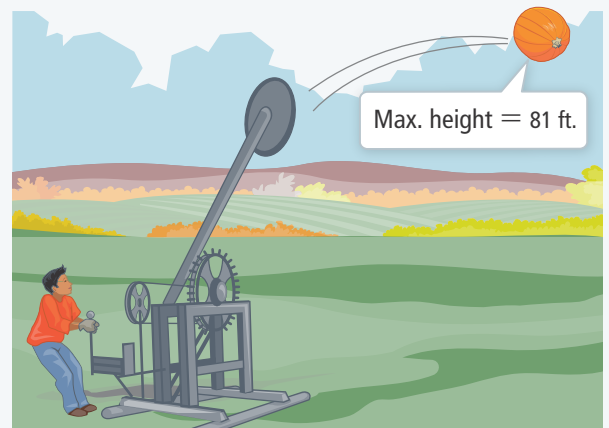


- What is the factored form of the equation for the height of the drone?
 - After how many seconds will the drone be at ground level?
 - After how many seconds will the drone come back to the height of its platform?
- 42. Higher Order Thinking** LaTanya is designing a rectangular garden with a uniform walkway around its border. LaTanya has 140 m² of material to build the walkway.
- Write an equation for the dimensions of the garden and the surrounding walkway.
 - How wide is the walkway? Explain.



ASSESSMENT PRACTICE

- 43.** Which of the following are solutions to the equation $-11x = 2x^2 + 15$? Select all that apply.
- (A) -5 (B) -3 (C) $-\frac{5}{2}$ (D) $\frac{5}{2}$ (E) 3 (F) 5
- 44. SAT/ACT** What is the sum of the zeros of the function $y = x^2 - 9x - 10$?
- (A) -10 (B) -9 (C) 0 (D) 9 (E) 10
- 45. Performance Task** A pumpkin is launched from the ground into the air and lands 4.5 s later.



- Part A** Write a quadratic function that models the height, in feet, of the pumpkin x seconds after it is launched. Explain how you found the function.
- Part B** A second pumpkin is launched from the ground. After 1 second, it is 64 feet high. The pumpkin lands after 5 seconds. What is the maximum height of the pumpkin? Explain.