**UNDERSTAND**

12. Construct Arguments Devin found the parabola that fits the three points in the table to be $y = 0.345x^2 - 0.57x - 2.78$. Is Devin correct? Explain.

x	−4	0.6	9
y	5	−3	20

13. Generalize How can you find the maximum or minimum value of a quadratic function?

14. Higher Order Thinking The quadratic function that represents the curve of the cereal bowl shown is $y = 0.32x^2 - 1.6x + 2$. Describe how you could use the function to find the diameter and the depth of the cereal bowl.
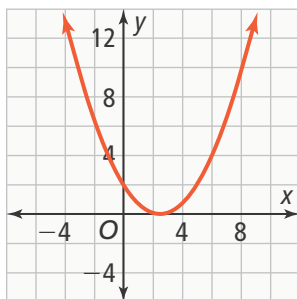
15. Error Analysis Micah found the vertex for the function $y = -9.5x^2 - 47.5x + 63$ as shown.

$$x = -\frac{b}{2a}$$

$$x = -\frac{47.5}{2(-9.5)}$$

$$x = -\frac{47.5}{-19}$$

$$x = -(-2.5)$$

$$x = 2.5$$

$$y = -9.5(2.5)^2 - 47.5(2.5) + 63$$

$$y = -59.375 - 118.75 + 63$$

$$y = -115.125$$

Find and correct Micah's error.

PRACTICE

Find the vertex of each parabola. SEE EXAMPLE 1
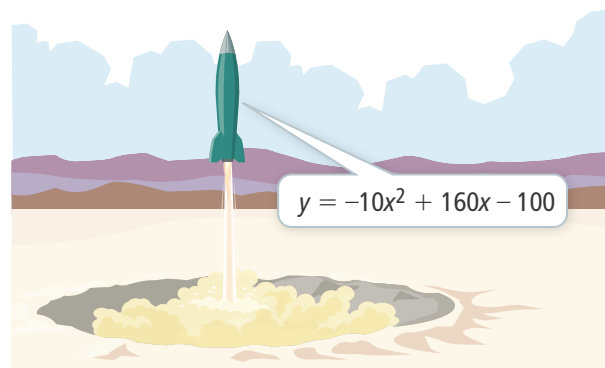
16. $y = -x^2 + 6x + 30$

17. $y = 3x^2 + 12x - 5$

Find the vertex and y-intercept of the quadratic function, and use them to graph the function. SEE EXAMPLES 1 AND 2

18. $y = -x^2 + 6x - 8$ **19.** $y = x^2 - 8x + 11$

20. $y = 3x^2 + 18x + 10$ **21.** $y = -2x^2 - 12x - 5$

22. A rocket is launched into the air. The path of the rocket is modeled by the equation $y = -10x^2 + 160x - 100$. What is the maximum height reached by the rocket, in feet?

$y = -10x^2 + 160x - 100$

Write the equation of a quadratic function in standard form for the parabola that passes through the given points. SEE EXAMPLE 4

23. (−1, 5), (4, 0), (5, −7)

24. (−2, 2), (1, 8), (4, 50)

Use quadratic regression to find the equation of a quadratic function that fits the given points. SEE EXAMPLE 5

25.

x	0	0.5	1	1.5	2
y	35	36	29	14	−9

APPLY

26. Model With Mathematics The height of Amelia's mid-section was measured three times during a long jump.

| Time in seconds, x	0	0.5	1
Height in meters, y	0.7	1.5	0.55

$h = 1.5$ meters

Write the equation of a quadratic function that describes Amelia's height as a function of time.

27. Make Sense and Persevere A college's business office found the relationship between the number of admissions counselors they employ and the college's profit from tuition could be modeled by the function $y = -10x^2 + 1{,}500x - 35{,}000$.

a. Graph the function.

b. How many admissions counselors should the college employ to maximize its profit?

c. What is the maximum amount of profit the college can make?

28. Mathematical Connections A rectangular tile has a perimeter of 48 inches.

a. The graph shows the relationship between the **width** of the tile and the **area** of the tile. What function describes this relationship?
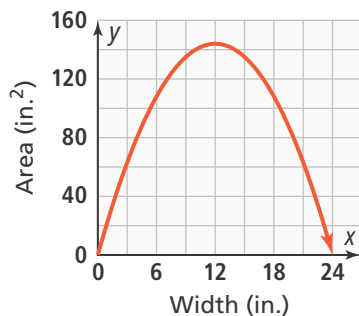
b. What is the maximum area? What length and width give the maximum area?

ASSESSMENT PRACTICE

29. Consider the quadratic function $y = 5x^2 - 50x - 100$. Which of the following are true? Select all that apply.

Ⓐ Its vertex is (5, −225).

Ⓑ Its y-intercept is (0, 100).

Ⓒ It passes through the point (−1, −45).

Ⓓ The minimum height occurs when $x = 5$.

Ⓔ The maximum height occurs when $x = 5$.

30. SAT/ACT Which quadratic equation contains the three points (−4, 12), (2, 42), and (3, 40)?

Ⓐ $y = -x^2 + 3x + 42$

Ⓑ $y = 1.7x^2 - 10x - 55.2$

Ⓒ $y = -1.7x^2 + 10x + 55.2$

Ⓓ $y = x^2 - 3x - 40$

Ⓔ $y = -x^2 + 3x + 40$

31. Performance Task A diver jumped from a diving platform. The image shows her height above the water at several different times after leaving the platform.

0.25 s, 27 ft

1.5 s, 29 ft

0.5 s, 29 ft

2.0 s, 25 ft

2.75 s, 15 ft
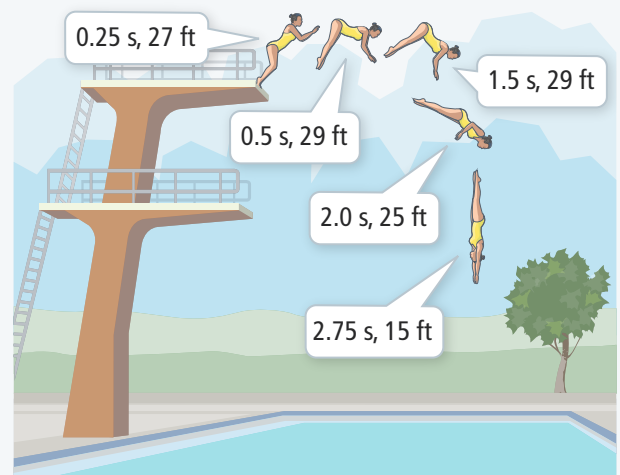
Part A Find the equation of the quadratic function that describes the relationship between the diver's time and height. Round to the nearest tenth.

Part B How high is the platform the diver jumped from? What is the maximum height reached?

Part C From the maximum height, how long does it take the diver to get halfway down? Which part of the dive is faster, from the top to the halfway point, or from the halfway point to the water? Explain.