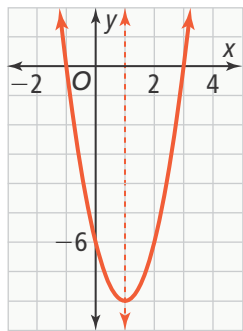




**UNDERSTAND**

- 10. Make Sense and Persevere** The graph of the function  $f(x) = 2x^2 - bx - 6$  is shown. What is the value of  $b$ ? Explain.



- 11. Construct Arguments** To identify the  $y$ -intercept of a quadratic function, would you choose to use vertex form or standard form? Explain.
- 12. Error Analysis** Describe and correct the error a student made when writing the quadratic function  $f(x) = 2(x + 3)^2 - 4$  in standard form.

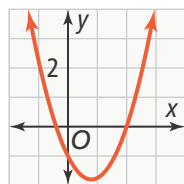
$$f(x) = 2(x + 3)^2 - 4$$

$$f(x) = 2x^2 + 6x + 9 - 4$$

$$f(x) = 2x^2 + 6x + 5$$



- 13. Communicate Precisely** Estimate the coordinates of the vertex of the graph of  $f(x) = 1.25x^2 - 2x - 1$  below. Then explain how to find the exact coordinates.



- 14. Higher Order Thinking** Points  $(2, -1)$ ,  $(-2, 7)$ ,  $(1, -2)$ ,  $(0, -1)$ , and  $(4, 7)$  lie on the graph of a quadratic function.
- What is the axis of symmetry of the graph?
  - What is the vertex?
  - What is the  $y$ -intercept?
  - Over what interval does the function increase?

**PRACTICE**

What is the  $y$ -intercept of each function?

SEE EXAMPLE 1

15.  $f(x) = 2x^2 - 4x - 6$     16.  $f(x) = 0.3x^2 + 0.6x - 0.7$   
 17.  $f(x) = -2x^2 - 8x - 7$     18.  $f(x) = 3x^2 + 6x + 5$   
 19.  $f(x) = -x^2 - 2x + 3$     20.  $f(x) = -0.5x^2 + x + 2$

Find the  $y$ -intercept, the axis of symmetry, and the vertex of the graph of each function. SEE EXAMPLE 2

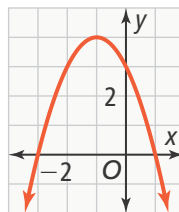
21.  $f(x) = 2x^2 + 8x + 2$     22.  $f(x) = -2x^2 + 4x - 3$   
 23.  $f(x) = 0.4x^2 + 1.6x$     24.  $f(x) = -x^2 - 2x - 5$   
 25.  $f(x) = 5x^2 + 5x + 12$     26.  $f(x) = 4x^2 + 12x + 5$   
 27.  $f(x) = x^2 - 6x + 12$     28.  $f(x) = -2x^2 + 16x + 40$

Compare each function to function  $f$ , shown in the table. Which function has a lesser minimum value? Explain. SEE EXAMPLE 3

$x$	$(x, f(x))$
1	(1, 0)
2	(2, -3)
3	(3, -4)
4	(4, -3)
5	(5, 0)

29.  $g(x) = 2x^2 + 8x + 3$     30.  $h(x) = x^2 + x - 3.5$

Compare each function to function  $f$ , shown in the graph below. Which function has a greater maximum value? SEE EXAMPLE 3



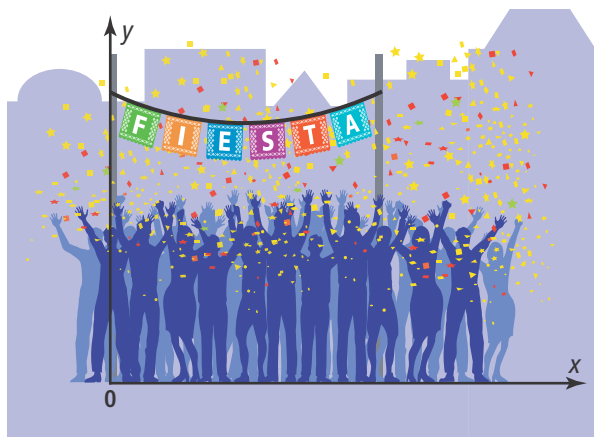
31.  $g(x) = -2x^2 - 4x + 3$     32.  $h(x) = -1.5x^2 - 4.5x + 1$
- Write each function in standard form. SEE EXAMPLE 4
33.  $f(x) = 4(x + 1)^2 - 3$     34.  $f(x) = 0.1(x - 2)^2 - 0.1$   
 35.  $f(x) = -2(x - 9)^2 + 15$     36.  $f(x) = -(x + 3)^2 + 8$

**APPLY**

37. **Use Structure** Two balls are tossed up into the air. The function  $f(x) = -4.9x^2 + 14.7x + 0.975$  models the path of Ball A. The path of Ball B over time is shown in the table. Which ball reaches a greater height? How much greater? Explain how you can answer without graphing either function.

Time (s)	Height (m)
$x$	$g(x)$
0	1.975
1	11.775
2	11.775
2.5	1.975

38. **Use Structure** The position of a ball after it is kicked can be determined by using the function  $f(x) = -0.11x^2 + 2.2x + 1$ , where  $y$  is the height, in feet, above the ground and  $x$  is the horizontal distance, in feet, of the ball from the point at which it was kicked. What is the height of the ball when it is kicked? What is the highest point of the ball in the air?
39. **Reason** A banner is hung for a party. The distance from a point on the bottom edge of the banner to the floor can be determined by using the function  $f(x) = 0.25x^2 - x + 9.5$ , where  $x$  is the distance of the point from the left end of the banner. How high above the floor is the lowest point on the bottom edge of the banner? Explain.

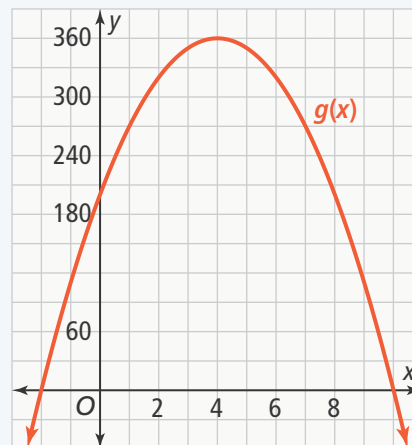


**ASSESSMENT PRACTICE**

40. An object is launched at 64 ft per second from an elevated platform. The function  $f(x) = -16x^2 + 64x + 6$ , models its trajectory over time,  $x$ . Which of the following are true? Select all that apply.
- Ⓐ The height of the platform is 6 ft.
  - Ⓑ The object reaches its maximum height after 2 seconds.
  - Ⓒ The maximum height of the object is 70 ft.
  - Ⓓ The object will be lower than 40 feet at 1 second.
  - Ⓔ The height of the object increases and then decreases.
41. **SAT/ACT** What is the maximum value of  $f(x) = -4x^2 + 16x + 12$ ?
- Ⓐ 12    Ⓑ 16    Ⓒ 24    Ⓓ 28    Ⓔ 64
42. **Performance Task** Two models are used to predict monthly revenue for a new sports drink. In each model,  $x$  is the number of \$1-price increases from the original \$2 per bottle price.

**Model A**  $f(x) = -12.5x^2 + 75x + 200$

**Model B**



**Part A** Identify the price you would set for each model to maximize monthly revenue. Explain.

**Part B** A third model includes the points  $(9, 605)$ ,  $(8, 600)$ ,  $(10, 600)$ ,  $(7, 585)$ , and  $(11, 585)$ . What price maximizes revenue according to this model? Explain.