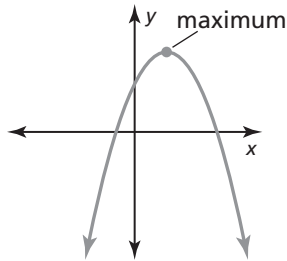


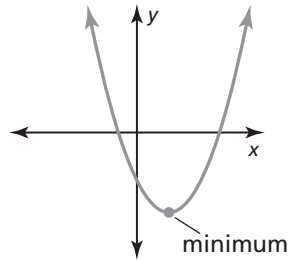
**8.3** Notetaking with Vocabulary (continued)**Maximum and Minimum Values**

The  $y$ -coordinate of the vertex of the graph of  $f(x) = ax^2 + bx + c$  is the **maximum value** of the function when  $a < 0$  or the **minimum value** of the function when  $a > 0$ .

$$f(x) = ax^2 + bx + c, a < 0$$



$$f(x) = ax^2 + bx + c, a > 0$$



**Notes:**

**Extra Practice**

In Exercises 1–4, find (a) the axis of symmetry and (b) the vertex of the graph of the function.

1.  $f(x) = x^2 - 10x + 2$

2.  $y = -4x^2 + 16x$

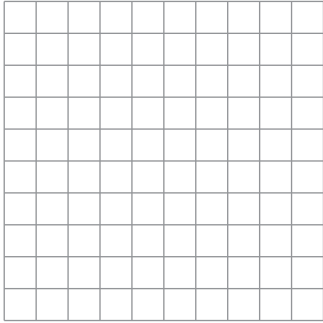
3.  $y = -2x^2 - 8x + 5$

4.  $f(x) = -3x^2 + 6x + 1$

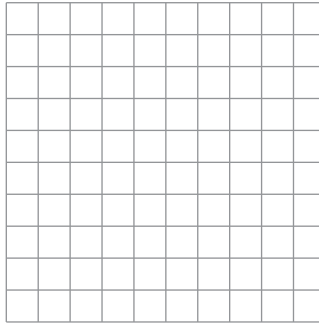
**8.3** Notetaking with Vocabulary (continued)

In Exercises 5–7, graph the function. Describe the domain and range.

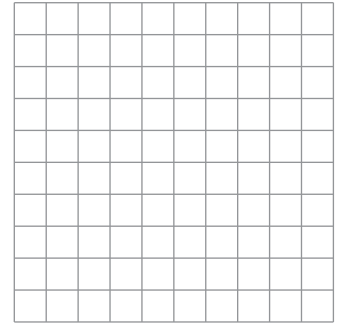
5.  $f(x) = 3x^2 + 6x + 2$



6.  $y = 2x^2 - 8x - 1$



7.  $y = -\frac{1}{5}x^2 - x + 5$



In Exercises 8–13, tell whether the function has a minimum value or a maximum value. Then find the value.

8.  $y = -\frac{1}{2}x^2 - 5x + 2$

9.  $y = 8x^2 + 16x - 2$

10.  $y = -x^2 - 4x - 7$

11.  $y = -7x^2 + 7x + 5$

12.  $y = 9x^2 + 6x + 4$

13.  $y = -\frac{1}{4}x^2 + x - 6$

14. The function  $h = -16t^2 + 250t$  represents the height  $h$  (in feet) of a rocket  $t$  seconds after it is launched. The rocket explodes at its highest point.

a. When does the rocket explode?

b. At what height does the rocket explode?