

**2.1** Extra Practice

In Exercises 1–6, describe the transformation of  $f(x) = x^2$  represented by  $g$ .

Then graph each function.

1.  $g(x) = x^2 + 4$

2.  $g(x) = x^2 - 7$

3.  $g(x) = (x - 1)^2 - 3$

4.  $g(x) = (-4x)^2$

5.  $g(x) = \frac{1}{3}x^2 - 6$

6.  $g(x) = -(x + 9)^2$

In Exercises 7–10, write a rule for  $g$  described by the transformations of the graph of  $f$ . Then identify the vertex.

7.  $f(x) = x^2$ ; vertical stretch by a factor of 5 and a reflection in the  $x$ -axis, followed by a translation 3 units down

8.  $f(x) = x^2$ ; vertical shrink by a factor of  $\frac{1}{2}$  and a reflection in the  $y$ -axis, followed by a translation 4 units left

9.  $f(x) = 9x^2 - 3$ ; horizontal stretch by a factor of 3 and a translation 4 units up, followed by a reflection in the  $y$ -axis

10.  $f(x) = (x - 12)^2 + 1$ ; horizontal shrink by a factor of  $\frac{1}{4}$  and a translation 8 units down, followed by a reflection in the  $x$ -axis

11. Let  $f(x) = (x - 1)^2 - 2$ . Describe a combination of different types of transformations of  $f$  that result in the original function.

## 2.2 Extra Practice

In Exercises 1–3, graph the function. Label the vertex and axis of symmetry.

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

2.  $y = -2(x - 4)^2 - 5$

3.  $t(x) = \frac{3}{2}x^2 - 3x - 1$

In Exercises 4–6, find the minimum value or maximum value of the function.

Find the domain and range of the function, and when the function is increasing and decreasing.

4.  $y = -4x^2 + 8x + 3$

5.  $k(x) = 5x^2 + 20x$

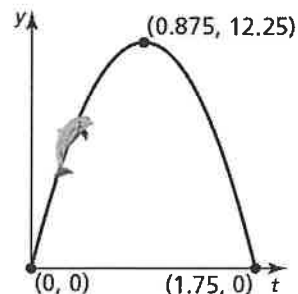
6.  $h(x) = \frac{1}{2}x^2 - 4x + 3$

In Exercises 7 and 8, graph the function. Label the x-intercept(s), vertex, and axis of symmetry.

7.  $f(x) = 4(x + 4)(x - 3)$

8.  $f(x) = -7x(x - 6)$

9. The height (in feet) of a dolphin above the water is given by  $f(t) = -16t(t - 1.5)$ , where  $t$  is the time (in seconds) since the dolphin jumped out of the water. The graph shows the path of a second dolphin that jumps out of the water. Which dolphin jumps higher? Which dolphin remains in the air longer? Justify your answer.



10. An archeologist has  $2k$  meters of rope to mark a rectangular dig site. What is the maximum area of the dig site in terms of  $k$ ?