

## 4-2

**Reteaching** (continued)

## Standard Form of a Quadratic Function

- Standard form of a quadratic function is  $y = ax^2 + bx + c$ . Vertex form of a quadratic function is  $y = a(x - h)^2 + k$ .
- For a parabola in vertex form, the coordinates of the vertex are  $(h, k)$ .

**Problem**

What is the vertex form of  $y = 3x^2 - 24x + 50$ ?

$$y = ax^2 + bx + c$$

$$y = 3x^2 - 24x + 50$$

$$b = -24, a = 3$$

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

$$= -\frac{-24}{2(3)}$$

$$= 4$$

$$y\text{-coordinate} = 3(4)^2 - 24(4) + 50$$

$$= 2$$

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

Verify that the equation is in standard form.

Find  $b$  and  $a$ .

For an equation in standard form, the  $x$ -coordinate of the vertex can be found by using  $x = -\frac{b}{2a}$ .

Substitute.

Simplify.

Substitute 4 into the standard form to find the  $y$ -coordinate.

Simplify.

Substitute 4 for  $h$  and 2 for  $k$  into the vertex form.

Once the conversion to vertex form is complete, check by multiplying.

$$y = 3(x^2 - 8x + 16) + 2$$

$$y = 3x^2 - 24x + 50$$

The result is the standard form of the equation.

**Exercises**

Write each function in vertex form. Check your answers.

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

6.  $y = -x^2 + 4x + 6$

7.  $y = x^2 + 3x - 10$

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

9.  $y = x^2 + x$

10.  $y = x^2 + 5x + 4$

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

12.  $y = \frac{3}{4}x^2 + 9x$

13.  $y = -2x^2 + 2x + 1$

Write each function in standard form.

14.  $y = (x - 3)^2 + 1$

15.  $y = 2(x - 1)^2 - 3$

16.  $y = -3(x + 4)^2 + 1$