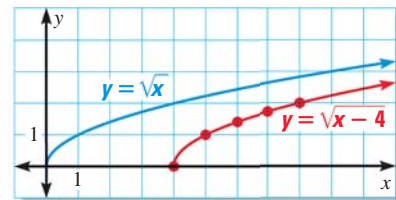**EXAMPLE 4** **Graph a function of the form** $y = \sqrt{x - h}$

Graph the function $y = \sqrt{x - 4}$ and identify its domain and range. Compare the graph with the graph of $y = \sqrt{x}$.

Solution

To graph the function, make a table, then plot and connect the points. To find the domain, find the values of x for which the radicand, $x - 4$, is nonnegative. The domain is $x \geq 4$.

x	4	5	6	7	8
y	0	1	1.4	1.7	2

The range is $y \geq 0$. The graph of $y = \sqrt{x - 4}$ is a horizontal translation (of 4 units to the right) of the graph of $y = \sqrt{x}$.

KEY CONCEPT *For Your Notebook*

Graphs of Square Root Functions

To graph a function of the form $y = a\sqrt{x - h} + k$, you can follow these steps.

STEP 1 **Sketch** the graph of $y = a\sqrt{x}$. The graph of $y = a\sqrt{x}$ starts at the origin and passes through the point $(1, a)$.

STEP 2 **Shift** the graph $|h|$ units horizontally (to the right if h is positive and to the left if h is negative) and $|k|$ units vertically (up if k is positive and down if k is negative).

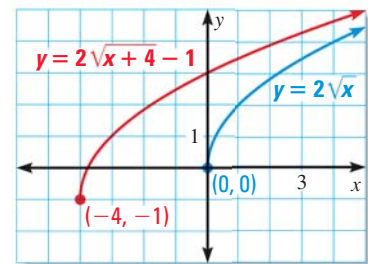**EXAMPLE 5** **Graph a function of the form** $y = a\sqrt{x - h} + k$

Graph the function $y = 2\sqrt{x + 4} - 1$.

STEP 1 **Sketch** the graph of $y = 2\sqrt{x}$.

STEP 2 **Shift** the graph $|h|$ units horizontally and $|k|$ units vertically. Notice that

$$y = 2\sqrt{x + 4} - 1 = 2\sqrt{x - (-4)} + (-1).$$

So, $h = -4$ and $k = -1$. Shift the graph left 4 units and down 1 unit.

✓ **GUIDED PRACTICE** for Examples 4 and 5

5. Graph the function $y = \sqrt{x + 3}$ and identify its domain and range. Compare the graph with the graph of $y = \sqrt{x}$.

6. Identify the domain and range of the function in Example 5.