11.1 Graph Square Root Functions

Before	You graphed linear, exponential, and quadratic functions.
Now	You will graph square root functions.
Why?	So you can analyze the speed of an athlete, as in Ex. 45.

Key Vocabulary
- radical expression
- radical function
- square root function
- parent square root function

A **radical expression** is an expression that contains a radical, such as a square root, cube root, or other root. A **radical function** contains a radical expression with the independent variable in the radicand. For example, $y = \sqrt[3]{2x}$ and $y = \sqrt{x + 2}$ are radical functions. If the radical is a square root, then the function is called a **square root function**.

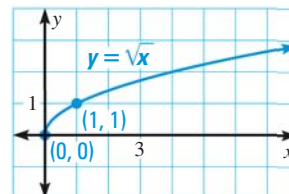### KEY CONCEPT   *For Your Notebook*

Parent Function for Square Root Functions

The most basic square root function in the family of all square root functions, called the **parent square root function**, is:

$$y = \sqrt{x}$$

The graph of the parent square root function is shown.

❖ EXAMPLE 1   Graph a function of the form $y = a\sqrt{x}$

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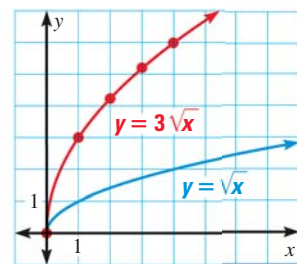
Solution

REVIEW SQUARE ROOTS
For help with square roots, see p. 110.

STEP 1 Make a table. Because the square root of a negative number is undefined, x must be nonnegative. So, the domain is $x \geq 0$.

x	0	1	2	3	4
y	0	3	4.2	5.2	6

STEP 2 Plot the points.

STEP 3 Draw a smooth curve through the points. From either the table or the graph, you can see the range of the function is $y \geq 0$.

STEP 4 Compare the graph with the graph of $y = \sqrt{x}$. The graph of $y = 3\sqrt{x}$ is a vertical stretch (by a factor of 3) of the graph of $y = \sqrt{x}$.