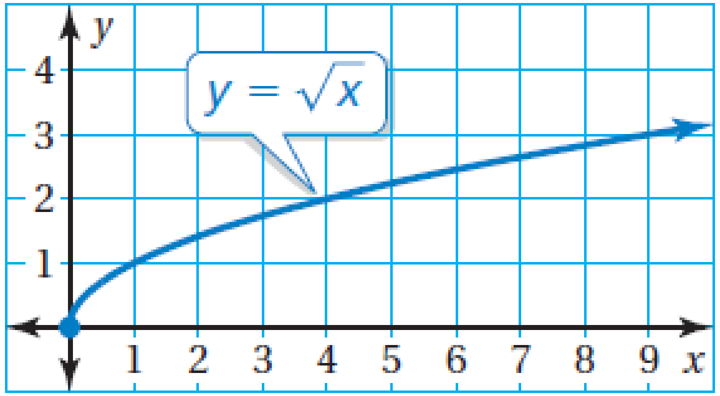
Graphing Square Root Functions
Lesson 10.1

Key Idea

Square Root Function

A **square root function** is a function that contains a square root with the independent variable in the radicand. The most basic square root function, also known as the parent square root function, is $y = \sqrt{x}$.



Square Root Graph $y = \sqrt{x}$.

- It looks like ½ of a parabola on its side.
- It starts at the vertex.
- Domain: $x \geq 0$
- Range: $y \geq 0$

EXAMPLE 1 Finding the Domain of a Square Root Function

Remember

The value of the radicand in the square root function cannot be negative. So, the domain of a square root function includes x-values for which the radicand is greater than or equal to 0.

Find the domain of $y = 3\sqrt{x - 5}$.

The radicand cannot be negative. So, $x - 5$ is greater than or equal to 0.

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$x \geq 5$	Add 5 to each side.

The domain is the set of real numbers greater than or equal to 5.

On Your Own

Find the domain of the function.

1. $y = 10\sqrt{x}$

$x \geq 0$

2. $y = \sqrt{x} + 7$

$x \geq 0$

3. $y = \sqrt{-x + 1}$

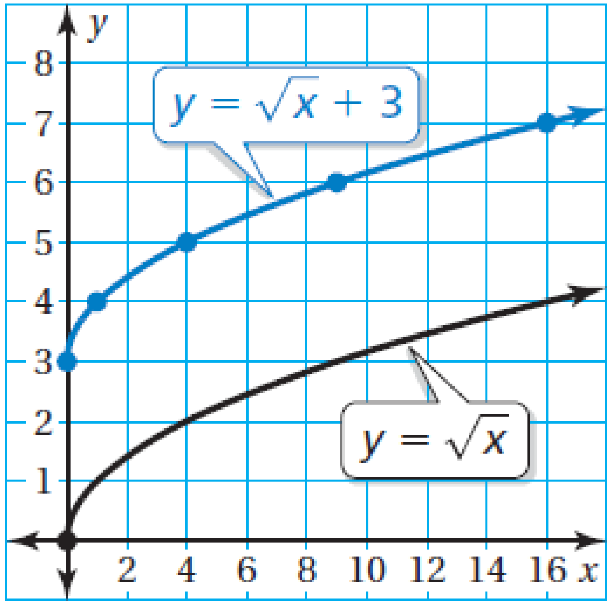
$x \leq 1$

EXAMPLE 2 Comparing Graphs of Square Root Functions

Graph $y = \sqrt{x} + 3$. Describe the domain and range. Compare the graph to the graph of $y = \sqrt{x}$.

Step 1: Make a table of values.

x	0	1	4	9	16
y	3	4	5	6	7



Step 2: Plot the ordered pairs.

Step 3: Draw a smooth curve through the points.

From the graph, you can see that the domain is $x \geq 0$ and the range is $y \geq 3$. The graph of $y = \sqrt{x} + 3$ is a translation is 3 units up of the graph of $y = \sqrt{x}$.

EXAMPLE 3 Comparing Graphs of Square Root Functions

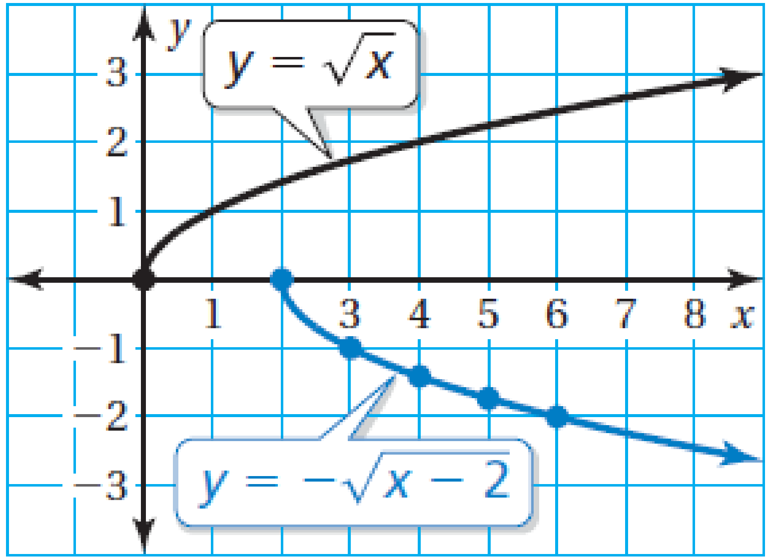
Graph $y = -\sqrt{x-2}$. Describe the domain and range. Compare the graph to the graph of $y = \sqrt{x}$.

Step 1: Make a table of values.

x	2	3	4	5	6
y	0	-1	-1.4	-1.7	-2

Step 2: Plot the ordered pairs.

Step 3: Draw a smooth curve through the points.

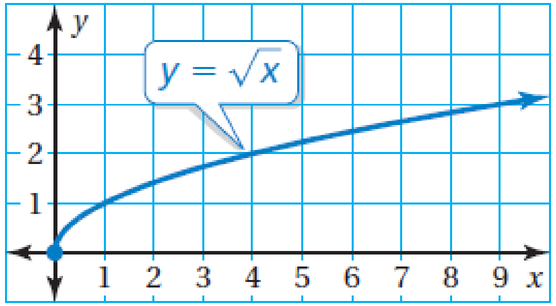


From the graph, you can see that the domain is $x \geq 2$ and the range is $y \leq 0$. The graph of $y = -\sqrt{x-2}$ is a reflection of the graph of $y = \sqrt{x}$ in the x-axis and then a translation 2 units to the right.

On Your Own

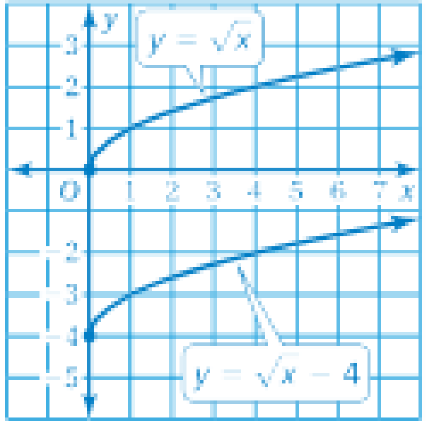
Graph the function. Describe the domain and range. Compare the graph to the graph of $y = \sqrt{x}$.

4. $y = \sqrt{x} - 4$



5. $y = \sqrt{x + 5}$

domain: $x \geq 0$; range: $y \geq -4$;
The graph of $y = \sqrt{x} - 4$ is a translation 4 units down of the graph of $y = \sqrt{x}$.



domain: $x \geq -5$; range: $y \geq 0$;
The graph of $y = \sqrt{x + 5}$ is a translation 5 units to the left of the graph of $y = \sqrt{x}$.