

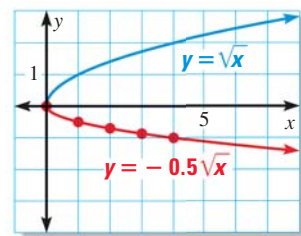
EXAMPLE 2 Graph a function of the form $y = a\sqrt{x}$

Graph the function $y = -0.5\sqrt{x}$ and identify its domain and range. Compare the graph with the graph of $y = \sqrt{x}$.

Solution

To graph the function, make a table, plot the points, and draw a smooth curve through the points. The domain is $x \geq 0$.

x	0	1	2	3	4
y	0	-0.5	-0.7	-0.9	-1



The range is $y \leq 0$. The graph of $y = -0.5\sqrt{x}$ is a vertical shrink (by a factor of 0.5) with a reflection in the x -axis of the graph of $y = \sqrt{x}$.

GRAPHS OF SQUARE ROOT FUNCTIONS Examples 1 and 2 illustrate the following:

- When $|a| > 1$, the graph of $y = a\sqrt{x}$ is a vertical stretch of the graph of $y = \sqrt{x}$. When $0 < |a| < 1$, the graph of $y = a\sqrt{x}$ is a vertical shrink of the graph of $y = \sqrt{x}$.
- When $a < 0$, the graph of $y = a\sqrt{x}$ is the reflection in the x -axis of the graph of $y = |a|\sqrt{x}$.

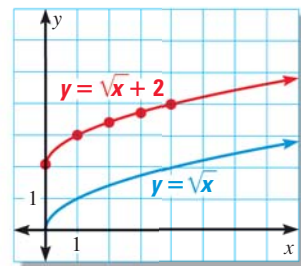
EXAMPLE 3 Graph a function of the form $y = \sqrt{x} + k$

Graph the function $y = \sqrt{x} + 2$ 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. The domain is $x \geq 0$.

x	0	1	2	3	4
y	2	3	3.4	3.7	4



The range is $y \geq 2$. The graph of $y = \sqrt{x} + 2$ is a vertical translation (of 2 units up) of the graph of $y = \sqrt{x}$.

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GUIDED PRACTICE for Examples 1, 2, and 3

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

1. $y = 2\sqrt{x}$
2. $y = -2\sqrt{x}$
3. $y = \sqrt{x} - 1$
4. $y = \sqrt{x} + 3$