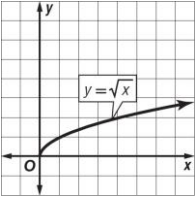# 10-1 Study Guide and Intervention
Square Root Functions

Dilations of Radical Functions A **square root function** contains the square root of a variable. Square root functions are a type of **radical function**.

In order for a square root to be a real number, the **radicand**, or the expression under the radical sign, cannot be negative. Values that make the radicand negative are not included in the domain.
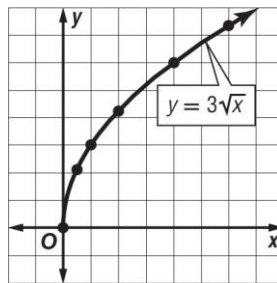
Square Root Function	Parent function: $f(x) = \sqrt{x}$ Type of graph: curve Domain: $\{x \mid x \geq 0\}$ Range: $\{y \mid y \geq 0\}$

Example: Graph $y = 3\sqrt{x}$. State the domain and range.

Step 1 Make a table. Choose nonnegative values for x

x	y
0	0
0.5	≈ 2.12
1	3
2	≈ 4.24
4	6
6	≈ 7.35

Step 2 Plot points and draw a smooth curve.

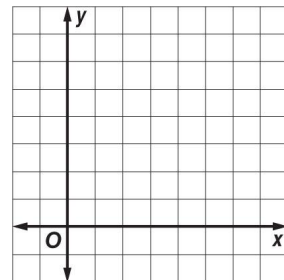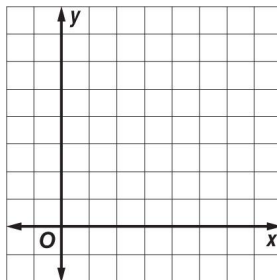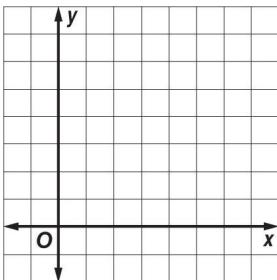The domain is $\{x \mid x \geq 0\}$ and the range is $\{y \mid y \geq 0\}$.

Exercises

Graph each function, and compare to the parent graph. State the domain and range.

1. $y = \dfrac{3}{2}\sqrt{x}$

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

3. $y = \dfrac{5}{2}\sqrt{x}$

# 10-1 Study Guide and Intervention *(continued)*
Square Root Functions

Reflections and Translations of Radical Functions Radical functions, like quadratic functions, can be translated horizontally and vertically, as well as reflected across the *x*-axis. To draw the graph of $y = a\sqrt{x + h} + k$, follow these steps.

Graphs of Square Root Functions	**Step 1** Draw the graph of $y = a\sqrt{x}$. The graph starts at the origin and passes through the point at (1, *a*). If *a* > 0, the graph is in the 1st quadrant. If *a* < 0, the graph is reflected across the *x*-axis and is in the 4th quadrant.
	Step 2 Translate the graph | *k* | units up if *k* is positive and down if *k* is negative.
	Step 3 Translate the graph | *h* | units left if *h* is positive and right if *h* is negative.

Example: Graph $y = -\sqrt{x + 1}$ and compare to the parent graph. State the domain and range.

Step 1 Make a table of values.

x	−1	0	1	3	8
y	0	−1	−1.41	−2	−3
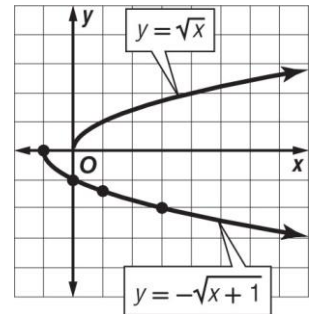
Step 2 This is a horizontal translation 1 unit to the left of the parent function and reflected across the *x*-axis. The domain is $\{x \mid x \geq -1\}$ and the range is $\{y \mid y \leq 0\}$.

Exercises

Graph each function, and compare to the parent graph. State the domain and range.

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

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

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