10-5

Reteaching

Graphing Square Root Functions

You can find the domain of a square root function by setting the values inside the radicand greater than or equal to zero. The domain tells you the limits of the *x*-values for a function. Use the domain to then find the range, which is the limit of the *y*-values. Knowing the domain saves time when developing coordinate pairs to graph for a square root function.

Problem

What are the domain and range of the function $y = 4\sqrt{-x+6}$?

The domain of a square root function must be greater than or equal to zero because there is no real square root of a negative radicand. Remember that while the radicand must not be negative, the *x*- and *y*-values of a function may be either positive or negative.

Solve $y = 4\sqrt{-x+6}$

$-x + 6 \geq 0$	The radicand must not be negative.
$-x \geq -6$	Subtract 6 from both sides to isolate the variable.
$x \leq 6$	Divide both sides by -1 to solve for *x*. Switch the direction of the inequality sign when you divide by a negative.

Check

x	y
6	0
5	4
2	8
−3	12
−10	16
−19	20

Create a table of values. What values of *x* will assure you always get a radicand value that is greater than or equal to 0?

Only values less than or equal to 6 will give you *x*-values that are greater than or equal to 0.
The range indicated by the table includes all *y*-values that are greater than or equal to 0.

Solution: The domain of the function $y = 4\sqrt{-x+6}$ is $x \leq 6$ and the range is $y \geq 0$.

Exercises

Find the domain and range of each function.

1. $y = \sqrt{x} + 12$

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

3. $y = \sqrt{1.5x+6}$

4. $y = \sqrt{6x+1}$

5. $y = \frac{1}{2}\sqrt{x+2}$

6. $y = \sqrt{7(x-2)}$

The domain and range of a function tell you where to start the graph of a square root function.

What is the graph of $y = \sqrt{x-4}$?

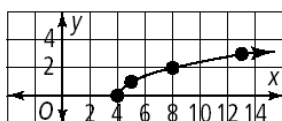Find the domain and create a table of values. Then plot the coordinate pairs to graph the function.

Solve

$y = \sqrt{x-4}$

$x \geq 4$ — Find the domain of the function.

x	y
4	0
5	1
8	2
13	3

Create a table of values to generate some coordinate pairs.

Notice that choosing values for *x* that make the radicand a perfect square creates integer coordinate pairs, which will make it easier to graph.

Graph the coordinate pairs from the table.

Check Use the rules for transforming a graph to check your graph.

For any positive number *h,* graphing $y = \sqrt{x-h}$ translates the graph of $y = \sqrt{x}$ to the right *h* units. For the function $y = \sqrt{x-4}$, $h = 4$, so the graph of $y = \sqrt{x}$ must move 4 units to the right.

Exercises

Graph each function.

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

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

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