

8.7: Using Radical Functions

I. Square Root Functions

A **square root function** is a function in the form $f(x) = \sqrt{x}$.

Example 4: Use the graph of $f(x) = \sqrt{x}$ to find the following values

a) $f(1) =$ b) $f(2) =$ c) $f(3) =$ c) $f(-9)$

Key Property:

The **domain** of an even index radical function $f(x) = \sqrt[n]{x}$ is $x > 0$, or (in interval notation) $[0, \infty)$

The domain of an **odd index radical function** $f(x) = \sqrt[n]{x}$ is *All Real Numbers*, or in interval notation $(-\infty, \infty)$

Example 5:

a) Find the domain of $f(x) = \sqrt{x - 12}$

Find the range of $f(x) = \sqrt{x - 12}$

b) Find the domain of $g(x) = -\sqrt[4]{9x - 27}$

Find the range of $g(x) = -\sqrt[4]{9x - 27}$

c) Find the range of $h(x) = \sqrt{9x - 27} + 5$

II. Graphing Radical Functions

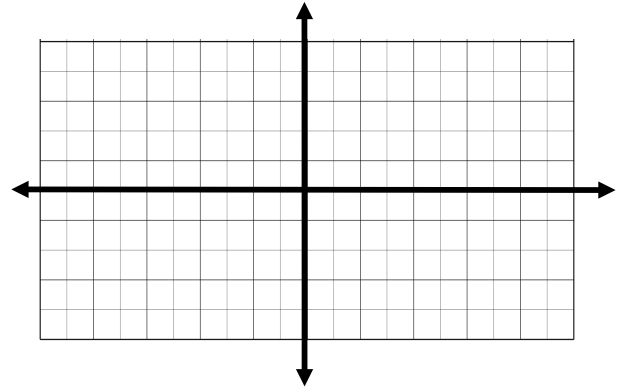
When working with functions, we often like to get a picture of all the inputs and outputs that are possible for the function. To do this, we graph the function in the coordinate plane.

Graphing Radicals

Let's begin by exploring and finding some points on the graph of $y = \sqrt{x}$.

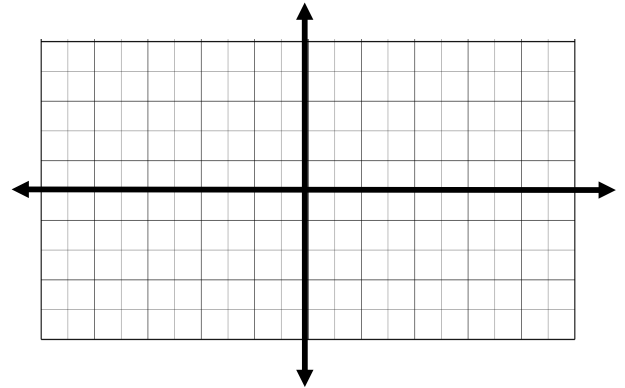
Complete the table of values for $f(x) = \sqrt{x}$

| | | | | | |
|-----|---|---|---|---|----|
| x | 0 | 1 | 4 | 9 | 16 |
| y | | | | | |



Complete the table of values for $f(x) = \sqrt[3]{x}$

| | | | | | |
|-----|---|---|---|----|----|
| x | 8 | 1 | 0 | -1 | -8 |
| y | | | | | |

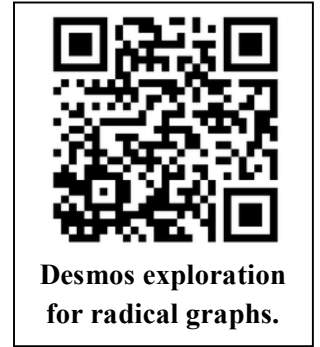


Example

Find the domain and range of $f(x) = \sqrt[3]{2x - 8}$

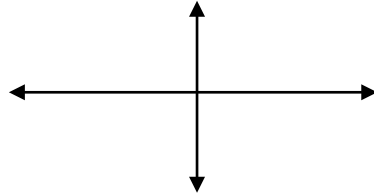
Explore – With Graphing Calculator

Your TI-8x calculator should be able to graph radicals of any index using the nth root command in the MATH menu, or the Desmos grapher has this option under “Functions” and “Misc”. Use this to answer the following:

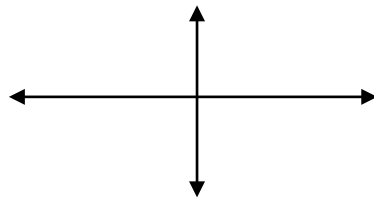


- a) In general, what does the graph of $y = \sqrt[n]{x}$ look like if n is an even integer?

(In Desmos, you can type this and make a slider to observe)



- b) In general, what does the graph of $y = \sqrt[n]{x}$ look like if n is an odd integer?



Other Applications

Example

The length of a rafter (L) is given by the function: $L = \frac{W}{2} \sqrt{S^2 + 1}$, where W = width of the building and S = slope of the roof. Find the slope of a rafter for a 240-inch wide building with a rafter length of 140 inches. Round your answer to 2 decimal places.

