8.1 Radical Expressions and Graphs

Objectives

- Find roots of numbers.
- Find principal roots.
- Graph functions defined by radical expressions.
- Find nth roots of nth powers.
- Use a calculator to find roots.

$\sqrt[n]{a}$

The *n*th root of *a*, *written* $\sqrt[n]{a}$, is a number whose *n*th power equals *a*. That is,

Simplifying Higher Roots

- $\sqrt[3]{27}$
- $\sqrt[3]{216}$
- $\sqrt[4]{256}$
- $\sqrt[5]{243}$
- $\sqrt[4]{\frac{16}{81}}$
- $\sqrt[3]{0.064}$

Finding Principal Roots

- **Case 1** If n is _____ and a is _____, then

- **Case 2** If n is _____ and a is _____, then

- **Case 3** If n is _____, then

Finding Roots

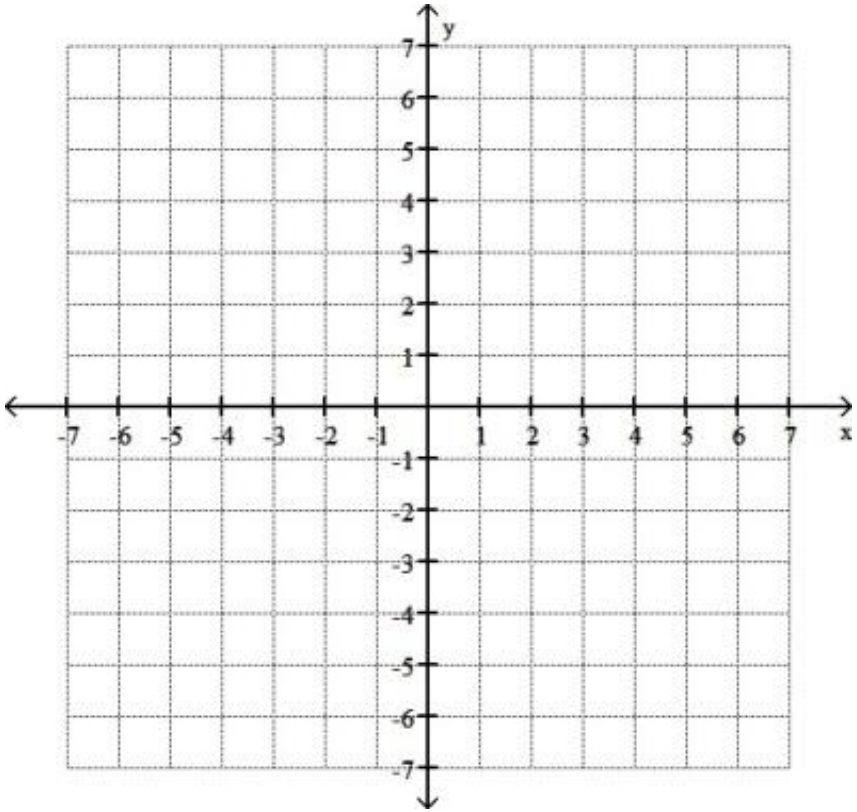
- $\sqrt{36}$
- $-\sqrt{36}$
- $\sqrt{-36}$
- $\sqrt[4]{16}$
- $-\sqrt[4]{16}$
- $\sqrt[4]{-16}$

Finding Roots

- $\sqrt[5]{243}$
- $-\sqrt[5]{243}$
- $\sqrt[5]{-243}$

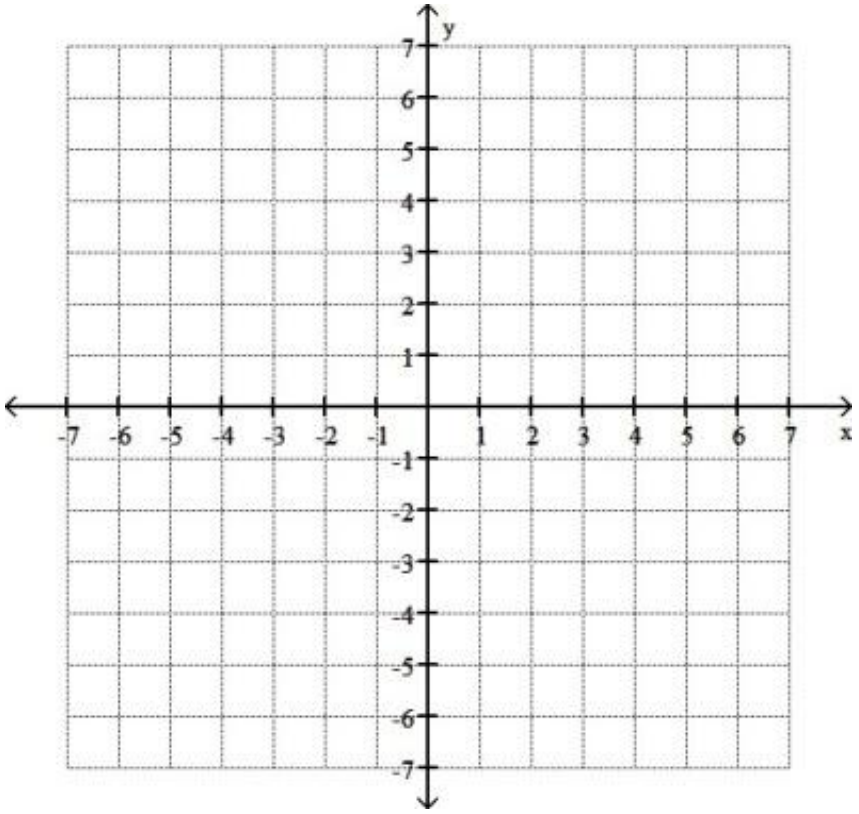
Square Root Function

- Graph $f(x) = \sqrt{x}$ and give the domain and range.



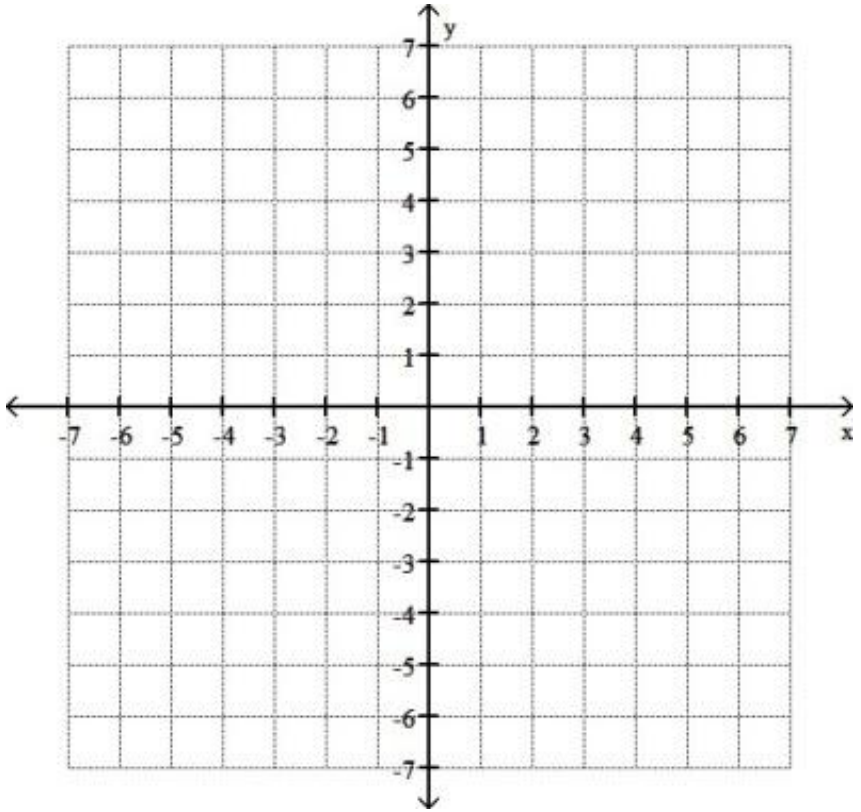
Cube Root Function

- Graph $f(x) = \sqrt[3]{x}$ and give the domain and range.



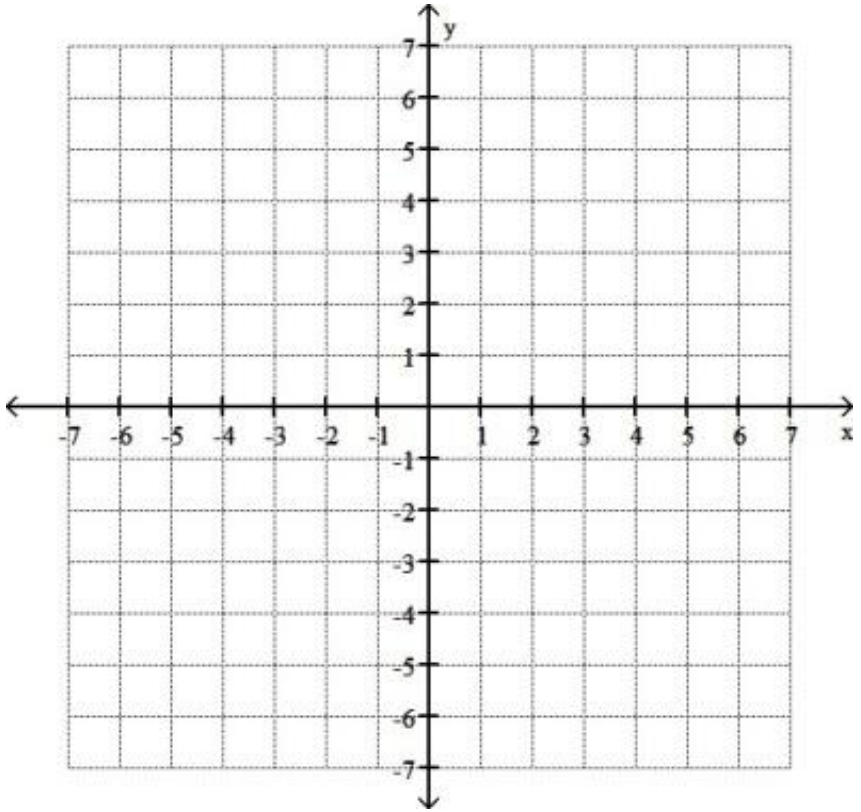
Graphing Functions Defined with Radicals

- Graph $f(x) = \sqrt{x+2}$ and give the domain and range.



Graphing Functions Defined with Radicals

- Graph $f(x) = \sqrt[3]{x} - 2$ and give the domain and range.



Find *n*th roots of *n*th Powers.

Simplifying Square Roots by Using Absolute Value

- $\sqrt{15^2}$
- $\sqrt{(-12)^2}$
- $\sqrt{y^2}$
- $\sqrt{(-y)^2}$

Find *n*th roots of *n*th Powers.

Simplifying Higher Roots by Using Absolute Value

- $\sqrt[4]{(-5)^4}$
- $\sqrt[5]{(-5)^5}$
- $-\sqrt[6]{(-3)^6}$
- $-\sqrt[4]{m^8}$

Simplifying Higher Roots by Using Absolute Value

- $\sqrt[3]{x^{24}}$
- $\sqrt[6]{y^{18}}$
- $\sqrt[3]{x^{15}}$
- $\sqrt{x^{12}}$

Finding an Approximation for Roots

- Use a calculator to approximate each radical to three decimal places.
  - $\sqrt{17}$
  - $-\sqrt{362}$
  - $\sqrt[3]{9482}$
  - $\sqrt[4]{6825}$