7.1 - Radical Expressions, Functions, & Models

Note Title

$3^2 = 9$, so 3 is a _____ _____ of 9.

$(-3)^2 = 9$, so -3 is a _____ _____ of 9.

Perfect Squares
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15

Square Root The number c is a *square root* of a if $c^2 = a$.

(1) Find the square roots of 49.

Principal Square Root The *principal square root* of a nonnegative number is its nonnegative square root. The symbol $\sqrt{\ }$ is called a *radical sign* and is used to indicate the principal square root of the number over which it appears.

(2) Simplify

a) $\sqrt{36}$ b) $\sqrt{0.64}$ c) $\sqrt{\frac{25}{81}}$

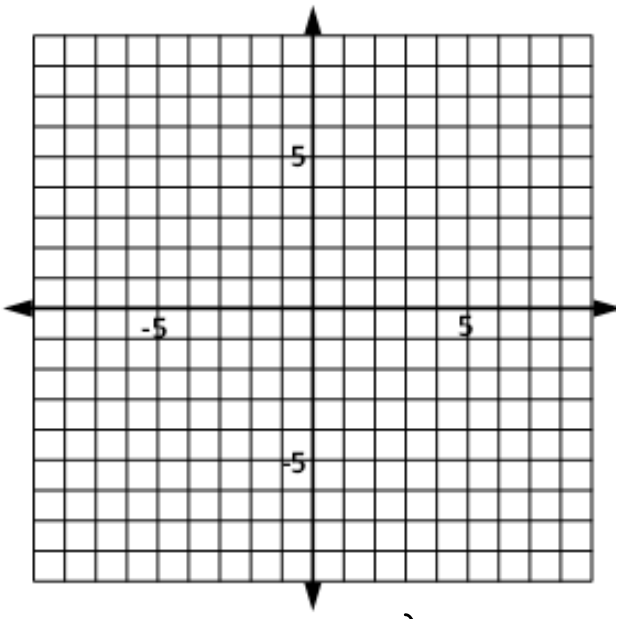
d) $-\sqrt{121}$ e) $\sqrt{40} \approx$

Any expression containing radicals is called a _____ _____.

Let's graph $f(x)=\sqrt{x}$

Domain?

x	$F(x)=\sqrt{x}$



(3) Evaluate the functions. (Domains?)

$f(x)=\sqrt{4-x}$, $g(x)=-\sqrt{2x-3}$

a) $g(2)$

b) $f(-5)$

(4) Evaluate, carefully.

a) $\sqrt{4^2}$

b) $\sqrt{(-4)^2}$

c) $\sqrt{a^2}$

Simplifying $\sqrt{a^2}$ For any real number a,

$\sqrt{a^2} = |a|$.

(The principal square root of a^2 is the absolute value of a.)

(5) Simplify

a) $\sqrt{(x+3)^2}$

b) $\sqrt{4x^2-12x+9}$

c) $\sqrt{r^{12}}$

d) $\sqrt{t^{10}}$

(6) Simplify, assuming variables are non-negative.

a) $\sqrt{y^6}$

b) $\sqrt{25x^2-10x+1}$

$3^3 = 27$, so 3 is a _____ _____ of 27

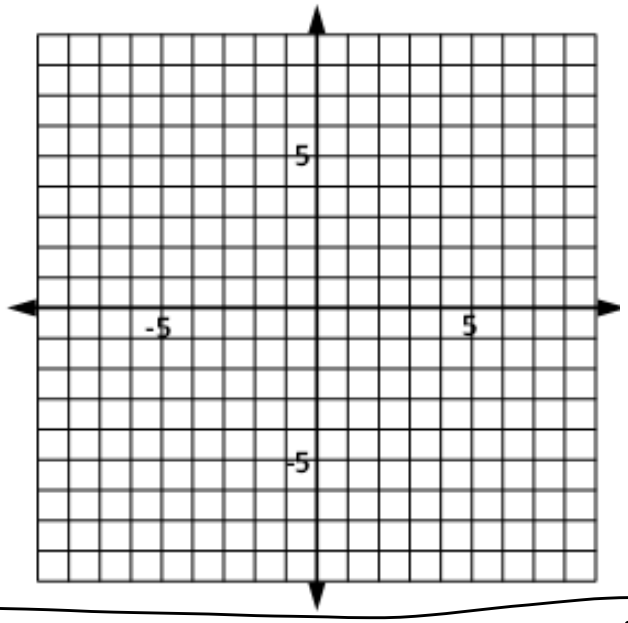
$(-3)^3 = -27$, so -3 is a _____ _____ of -27.

Cube Root The number c is the *cube root* of a if $c^3 = a$. In symbols, we write $\sqrt[3]{a}$ to denote the cube root of a.

Let's graph $f(x)=\sqrt[3]{x}$

Domain?

x	$F(x)=\sqrt[3]{x}$



If $b^n=a$, then b is the _____ _____ of a.

Perfect Cubes
1
2
3
4
5
6
7

(7) Evaluate

a) $\sqrt[3]{216}$

b) $\sqrt[4]{81}$

c) $\sqrt[3]{-64}$

d) $-\sqrt[5]{-32}$

e) $\sqrt[4]{-81}$

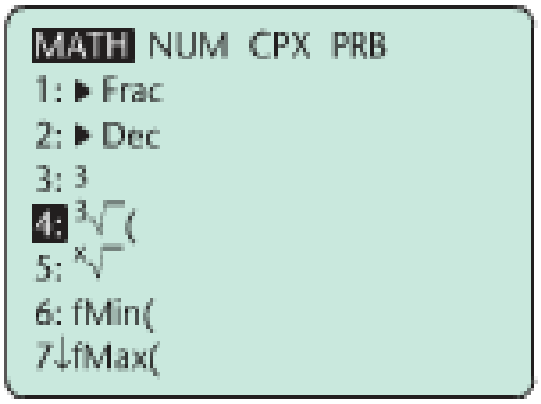
f) $\sqrt[5]{r^5}$

g) $\sqrt[6]{x^6}$

Simplifying *n*th roots

n	a	$\sqrt[n]{a}$	$\sqrt[n]{a^n}$
Even	Positive	Positive	$\lvert a \rvert$ (or a)
	Negative	Not a real number	$\lvert a \rvert$ (or $-a$)
Odd	Positive	Positive	a
	Negative	Negative	a

Radical Functions - functions described by radical expressions.



Be very careful typing them into Y1.

(8) Find the domain of the functions algebraically, then use the graph to determine the range.

a) $f(x) = \sqrt{-x}$

b) $g(x) = \sqrt{4x - 3} - 2$

c) $r(x) = \sqrt{x^2 + 1}$

d) $s(x) = \sqrt[4]{5 - 2x}$

---

(9) Determine whether a radical function would be a good model.

116. *Farm Size.* The following table lists the average size of United States' farms for various years from 1940 to 2002.

Year	Average Size of Farm (in acres)
1940	175
1960	303
1980	426
1997	431
2002	441

Source: U.S. Department of Agriculture

118. *Cancer Research.* The following table lists the amount of federal funds allotted to the National Cancer Institute for cancer research in the United States from 2003 to 2007.

Year	Funds (in billions)
2003	$4.59
2004	4.74
2005	4.83
2006	4.79
2007*	4.75

*Requested
Source: National Cancer Institute