1-3 Radicals

Definition
nth root

$$\sqrt[n]{b} = a \text{ means } b = a^n$$

- if $n \geq 2$ and even then a and b must be greater than or equal to 0.
- if $n \geq 3$ and odd, then a and b can be any real number.

In $\sqrt[n]{b}$:

The symbol $\sqrt{\ }$ is called the radical

n is called the index

b is called the radicand

if there is no index, it is 2

on test!

Feb 15-7:11 AM

Evaluate

*what # multiplies by itself 4 times to get 16

$\sqrt{9}$ 3 $\quad \sqrt{49}$ 7 $\quad \sqrt[4]{16}$ 2

$\sqrt[3]{64}$ 4 $\quad \sqrt[3]{-8}$ -2 $\quad \sqrt[4]{81}$ 3

Feb 15-7:29 AM

You try

$\sqrt{121}$ $\quad \sqrt[3]{125}$

$\sqrt[3]{-216}$ $\quad \sqrt[5]{32}$

Feb 15-7:35 AM

Simplifying
If n≥2 is a positive integer and a is a real number, then

$\sqrt[n]{a^n} = a$ if $n \geq 3$ is odd

$\sqrt[n]{a^n} = |a|$ if $n \geq 2$ is even

Feb 15-7:38 AM

Reduce

$\sqrt{x^2} = x$ $\quad \sqrt[5]{x^5} = x$

* $\sqrt{x}$ and x^2 are opposites so they cancel out.

Feb 15-8:59 AM

You try

$\sqrt[3]{x^3} = x$ $\quad \sqrt[6]{z^6}$

*

$\sqrt[4]{x^3}$ ← cannot cancel!

Feb 15-7:43 AM

Simplify

with calc = 4.2.... ☹ No decimals!

$\sqrt{18}$

$\sqrt{3^2} = 3$ so $3\sqrt{2}$

$\sqrt{2}$ so

$\sqrt[3]{40}$ $\sqrt[3]{2^3} = 2$ $\sqrt{5}$ $2\sqrt{5}$

Feb 23-6:47 AM

Simplify

(remember $\sqrt{x^2} = |x|$)

$2 \cdot 5\sqrt[3]{24}$ $10\sqrt[3]{3}$

$\sqrt{128x^2}$ $2^3 \times \sqrt{2}$ so $8x\sqrt{2}$

$\sqrt[4]{20}$ Not 4 of same so $\sqrt[4]{20}$

Feb 23-6:48 AM

You try

$\sqrt{48}$ $2^2\sqrt{3}$ $4\sqrt{3}$

$4\sqrt[3]{54}$

$\sqrt{200a^2}$ $2.5a\sqrt{2}$ $10a\sqrt{2}$

$\sqrt[4]{40}$

Feb 23-6:49 AM

Simplify

$\sqrt{12p^2q}$ $2p\sqrt{3q}$

Aug 10-11:28 AM

Remember that

$\sqrt[n]{a^n} = a$ if $n \geq 3$ is odd

$\sqrt[n]{a^n} = |a|$ if $n \geq 2$ is even

For example

$\sqrt{x^2} = |x|$ $\sqrt[3]{x^3} = x$ $\sqrt[4]{x^4} = |x|$ and so on

But to make our life easier some instructions will say "Assume all variables are greater then or equal to zero." In which case:

$\sqrt{x^2} = x$ $\sqrt[3]{x^3} = x$ $\sqrt[4]{x^4} = x$ and so on

SO READ YOUR INSTRUCTIONS!!!

Feb 23-6:54 AM

Reduce Assuming all variables are greater then or equal to zero.

(You can either do these using rational exponents or not.)

$\sqrt{x^6}$ x^3

$\sqrt[3]{x^{12}}$

Feb 23-7:03 AM

You try

$\sqrt{48}$ $4\sqrt[3]{54}$

$\sqrt{200a^2}$ $\sqrt[4]{40}$

Feb 23-6:49 AM

Reduce Assuming all variables are greater then or equal to zero.

$\sqrt{20x^{10}}$

$2x^5\sqrt{5}$

Feb 23-7:07 AM

You try

$\sqrt{75a^6}$

Feb 23-7:08 AM

Simplify Assuming all variables are greater then or equal to zero.

$\sqrt{80a^3}$

$4a\sqrt{5a}$

$\sqrt[3]{27m^4n^{14}}$

$3mn^3\sqrt[3]{mn^2}$

Feb 23-7:08 AM

You Try

$\sqrt[3]{128x^6y^{10}}$ $\sqrt[4]{16a^5b^{11}}$

Feb 23-7:09 AM

Aug 9-11:37 AM