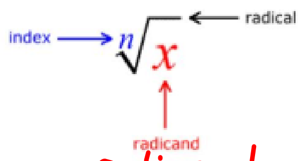
Bellwork - Copy the following down in your spiral/comp notebook.

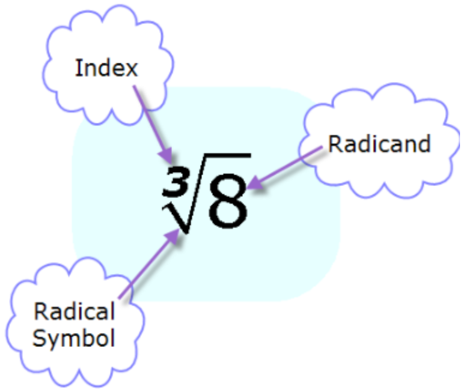
Parts of a Radical

- Radical Symbol: the symbol √ or indicating extraction of a root of the quantity that follows it
- Radicand: the quantity under a radical sign
- Index:



radicand

- If there is no Index number written, then it is an understood 2!



Aug 29-7:18 PM

	Square Root	Cube Root
1	$\sqrt{1}$	$\sqrt[3]{1}$
2	$\sqrt{4}$	$\sqrt[3]{8}$
3	$\sqrt{9}$	$\sqrt[3]{27}$
4	$\sqrt{16}$	$\sqrt[3]{64}$
5	$\sqrt{25}$	$\sqrt[3]{125}$
6	$\sqrt{36}$	$\sqrt[3]{216}$
7	$\sqrt{49}$	$\sqrt[3]{343}$
8	$\sqrt{64}$	$\sqrt[3]{512}$
9	$\sqrt{81}$	$\sqrt[3]{729}$
10	$\sqrt{100}$	$\sqrt[3]{1000}$

Aug 29-7:20 PM

1. If $\sqrt[4]{6^{33}} = 6^{\frac{33}{4}}$, what do you think $(\sqrt[3]{71})^4$ equals?

$(\sqrt[3]{71})^4 = 71^{\frac{4}{3}}$ $(\sqrt[4]{6})^{33}$

$71^{\frac{4}{3}}$

2. If $4^{\frac{3}{5}} = \sqrt[5]{4^3}$, what do you think $6^{\frac{2}{3}}$ equals?

$6^{\frac{2}{3}} = \sqrt[3]{6^2} = (\sqrt[3]{6})^2$

Exponent on Radicand

$\sqrt[5]{7^2} = 7^{\frac{2}{5}}$

Root/ Index

- Tip for students: $x^{\frac{power\,(flower)}{index\,(root)}} = \sqrt[root]{x^{power}}$ the fraction bar is the ground, flowers grow above the ground and is the exponent (or power). Roots grow into the ground so the denominator is the root (index) of the radical.

Aug 29-4:38 PM

Section 1 – Topic 6
Radical Expressions and Expressions with Rational Exponents

Aug 29-4:43 PM

pg. 16

Exponents are not always in the form of integers. Sometimes you will see them expressed as rational numbers. $\frac{a}{b}$ $\frac{-3}{1}, \frac{5}{4}, \frac{4}{7}$

Consider the following expressions with rational exponents. Use the property of exponents to rewrite them as radical $\sqrt{}$ expressions. $(x^a)^b = x^{ab}$

$9^{\frac{1}{2}} = (3^2)^{\frac{1}{2}} = 3^{\left(2 \cdot \frac{1}{2}\right)} = 3$

$\sqrt[2]{9} = \sqrt{9} = 3$

$8^{\frac{1}{3}} = (2^3)^{\frac{1}{3}} = 2^{\left(3 \cdot \frac{1}{3}\right)} = 2$

$\sqrt[3]{8} = 2$

$8^{\frac{1}{3}}$

$\left(\sqrt[3]{8}\right)^1$

$\left(\sqrt[3]{8^1}\right)$

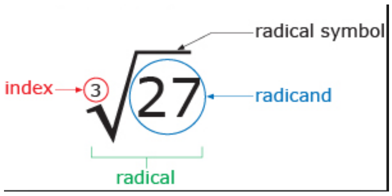
Do you notice a pattern? If so, what pattern did you notice?

$9^{\frac{1}{2}} = 3 = \sqrt{9}$ and $8^{\frac{1}{3}} = 2 = \sqrt[3]{8}$

Aug 29-4:44 PM

pg. 16

Consider the following expression with rational exponents. Use the pattern above and the property of exponents to rewrite them as radical expressions.



$2^{\frac{2}{3}} = (2^2)^{\left(\frac{1}{3}\right)} = \sqrt[3]{2^2}$

or $\left(2^{\frac{1}{3}}\right)^2 = \left(\sqrt[3]{2}\right)^2$

$5^{\left(\frac{3}{2}\right)} = (5^3)^{\frac{1}{2}} = \sqrt{5^3}$

or $\left(5^{\frac{1}{2}}\right)^3 = \left(\sqrt{5}\right)^3$

Aug 29-4:47 PM

pg. 16

For exponents that are rational numbers, such as $\frac{a}{b}$, we have $x^{\frac{a}{b}} = \underline{\sqrt[b]{x^a}} = \underline{(\sqrt[b]{x})^a}$.

- Tip for students: $x^{\frac{power\,(flower)}{index\,(root)}} = \sqrt[root]{x^{power}}$ the fraction bar is the ground, flowers grow above the ground and is the exponent (or power). Roots grow into the ground so the denominator is the root (index) of the radical.

Aug 29-4:48 PM

Let's Practice! pg. 17

$\boxed{x^{\frac{a}{b}} = \underline{\sqrt[b]{x^a}} = \underline{(\sqrt[b]{x})^a}}$

1. Use the rational exponent property to write an equivalent expression for each of the following radical expressions.

a. $(\sqrt[2]{x+2})^1$

$(x+2)^{\left(\frac{1}{2}\right)}$

$(x+2)^{\frac{1}{2}}$

b. $\sqrt[3]{x-5}+2$

$(x-5)^{\frac{1}{3}}+2$

$(x-5)^{\frac{1}{3}}+2$

- Tip for students: $x^{\frac{power\,(flower)}{index\,(root)}} = \sqrt[root]{x^{power}}$ the fraction bar is the ground, flowers grow above the ground and is the exponent (or power). Roots grow into the ground so the denominator is the root (index) of the radical.

Aug 29-4:49 PM

2. Use the rational exponent property to write each of the following expressions as integers.

pg. 17

$\boxed{x^{\frac{a}{b}} = \underline{\sqrt[b]{x^a}} = \underline{(\sqrt[b]{x})^a}}$

a. $9^{\frac{1}{2}}$ $\sqrt[2]{9}$

$\sqrt{9} = 3$

b. $16^{\frac{1}{2}}$

$\sqrt{16} = 4$

c. $8^{\frac{1}{3}}$

$\sqrt[3]{8} = 2$

d. $8^{\frac{2}{3}}$

A $(\sqrt[3]{8})^2 = 2^2 = 4$

$\sqrt[3]{8^2} = \sqrt[3]{64} = 4$

e. $125^{\frac{2}{3}}$

$(\sqrt[3]{125})^2 = 5^2 = 25$

f. $16^{\frac{3}{4}}$

$(\sqrt[4]{16})^3 = 2^3 = 8$

Aug 29-4:50 PM

Try It! pg. 17

$\boxed{x^{\frac{a}{b}} = \underline{\sqrt[b]{x^a}} = \underline{(\sqrt[b]{x})^a}}$

3. Use the rational exponent property to write an equivalent expression for each of the following radical expressions.

a. $\sqrt{y}$

$y^{\frac{1}{2}}$

b. $\sqrt[5]{y+6} - 3$

$(y+6)^{\frac{1}{5}} - 3$

Aug 29-4:51 PM

4. Use the rational exponent property to write each of the following expressions as integers. pg. 17

$x^{\frac{a}{b}} = \underline{\sqrt[b]{x^a}} = \underline{(\sqrt[b]{x})^a}$

a. $49^{\frac{1}{2}}$

$\sqrt{49} = 7$

b. $27^{\frac{1}{3}}$

$\sqrt[3]{27} = 3$

c. $216^{\left(\frac{2}{3}\right)}$

$\left(\sqrt[3]{216}\right)^2 = 6^2 = 36$

Aug 29-4:51 PM

BEAT THE TEST! pg. 18

1. Match each of the following to its equivalent expression.

$x^{\frac{a}{b}} = \underline{\sqrt[b]{x^a}} = \underline{(\sqrt[b]{x})^a}$

A. $2^{\frac{1}{3}}$	1. $m^{\frac{1}{2}} - 3$
B. $\sqrt{m-3}$	2. $(3m)^{\frac{1}{2}}$
C. $2^{\frac{2}{3}}$	3. $(m-3)^{\frac{1}{2}}$
D. $\sqrt{m} - 3$	4. $\sqrt{2}$
E. $2^{\frac{1}{2}}$	5. $\sqrt[3]{4}$
F. $\sqrt{3m}$	6. $\sqrt[3]{2}$

$2^{\frac{2}{3}} = \sqrt[3]{2^2} = \sqrt[3]{4}$

Aug 29-4:51 PM

Homework

Worksheet - **Section 1 Topic 6 Practice: Rational exponents and radicals**

Quiz Tuesday, September 4

Rules of Exponents

Aug 29-4:52 PM

Aug 30-1:04 PM