

## Agenda

1) DO NOW:

Review Rules of Exponents

2) DISCOVER:

Patterns/Rules of Fractional  
Exponents

3) APPLY

Example Problems

*HW: "Math 518 Exponent Practice 2"*  
*Worksheet*

## DO NOW

### Fill in the Rules of Exponents List

#### Rules of Exponents

$a^m \cdot a^n =$	$a^{-n} =$
$\frac{a^m}{a^n} =$	$\left(\frac{a}{b}\right)^{-n} =$
$(a^m)^n =$	$\frac{a^{-n}}{b^{-m}} =$
$(a \cdot b)^n =$	$\frac{a^{-n} \cdot c^p}{b^m} =$
$\left(\frac{a}{b}\right)^n =$	$\frac{a^{-n} \cdot c^p}{b^m} =$
$x^{\frac{1}{2}} =$	$x^{\frac{1}{n}} =$
$x^{\frac{1}{3}} =$	$x^{\frac{m}{n}} =$

We know that  $2^2$  means  $2 \cdot 2$  and that  $2^{-2}$  means  $\frac{1}{2} \cdot \frac{1}{2}$   
 but how do we find meaning in exponents like  $\frac{1}{2}$ ?

The following explorations will help you find a way to relate this expression to something that you already know.

Use your calculator to evaluate the following.

1.  $4^{\frac{1}{2}} =$  \_\_\_\_\_       $9^{\frac{1}{2}} =$  \_\_\_\_\_       $16^{\frac{1}{2}} =$  \_\_\_\_\_       $25^{\frac{1}{2}} =$  \_\_\_\_\_

2. What do you think it means to raise something to the one-half power?

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3. How could you rewrite  $x^{\frac{1}{2}}$ ? \_\_\_\_\_

4. Without using your calculator, what is  $100^{\frac{1}{2}}$ ? \_\_\_\_\_

5. Use your calculator to evaluate the following:

$8^{\frac{1}{3}} =$  \_\_\_\_\_       $27^{\frac{1}{3}} =$  \_\_\_\_\_       $64^{\frac{1}{3}} =$  \_\_\_\_\_       $125^{\frac{1}{3}} =$  \_\_\_\_\_

6. What do you think it means to raise something to the one-third power?

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7. How could you rewrite  $x^{\frac{1}{3}}$ ? \_\_\_\_\_

8. Calculate  $2^{\frac{1}{2}} =$  \_\_\_\_\_ Calculate  $\sqrt{2} =$  \_\_\_\_\_

Calculate  $2^{\frac{1}{3}} =$  \_\_\_\_\_ Calculate  $\sqrt[3]{2} =$  \_\_\_\_\_

Calculate  $2^{\frac{1}{4}} =$  \_\_\_\_\_ Calculate  $\sqrt[4]{2} =$  \_\_\_\_\_

Calculate  $2^{\frac{1}{5}} =$  \_\_\_\_\_ Calculate  $\sqrt[5]{2} =$  \_\_\_\_\_

What appears to be the role of the denominator in the fractional exponent?

9. How could you rewrite  $x^{\frac{1}{n}}$  using radicals?  $x^{\frac{1}{n}} =$  \_\_\_\_\_

How could you rewrite  $\sqrt[n]{x}$  using exponents?  $\sqrt[n]{x} =$  \_\_\_\_\_

10. Rewrite using fractional exponents:

$$(\sqrt[4]{2})^9 =$$

$$\sqrt{9^3} =$$

11. Rewrite using radical form. Simplify if possible!

$$8^{\frac{2}{3}} =$$

12. How could you rewrite  $x^{\frac{a}{b}}$  using radicals?  $x^{\frac{a}{b}} =$  \_\_\_\_\_

How could you rewrite  $\sqrt[b]{x^a}$  using exponents?  $\sqrt[b]{x^a} =$  \_\_\_\_\_

**Examples. No calculator!**

1.  $81^{\frac{1}{2}}$

2.  $(-81)^{\frac{1}{2}}$

3.  $-81^{\frac{1}{2}}$

4.  $81^{-\frac{1}{2}}$

5.  $(27)^{\frac{2}{3}}$

6.  $(9)^{\frac{3}{2}}$

7.  $(-125)^{\frac{2}{3}}$

Rewrite in exponential form:

8.  $\sqrt[3]{x}$

9.  $\sqrt[3]{z^5}$

10.  $\sqrt[3]{x^2y^3}$

Rewrite in radical form:

11.  $(xy)^{\frac{1}{4}}$

12.  $7^{\frac{2}{3}}$

13.  $xy^{\frac{1}{2}}$

***HW: "Math 518 Exponent Practice 2" Worksheet***

**Math 518 Exponent Practice 2**

**Name:** \_\_\_\_\_

**A. Warm up:** We know now  $x^{\frac{1}{3}} = \sqrt[3]{x}$ , then what is:

a) $x^{\frac{1}{3}} =$	b) $x^{\frac{1}{4}} =$	c) $x^{\frac{1}{5}} =$	d) $x^{\frac{1}{6}} =$	e) $x^{\frac{1}{7}} =$
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**Evaluate the following:**

1) $x^{\frac{1}{3}} \cdot x^{\frac{1}{3}} \cdot x^{\frac{1}{3}}$	2) $\left(x^{\frac{1}{3}}\right)^3$	3) $27^{\frac{2}{3}}$
4) $(-8)^{\frac{4}{3}}$	5) $8^{\frac{1}{3}} \cdot 125^{\frac{2}{3}}$	6) $-27^{\frac{2}{3}} \cdot 1000^{\frac{2}{3}}$
7) $27^{\frac{1}{3}}$	8) $(-8)^{\frac{1}{3}}$	9) $(125)^{-\frac{1}{3}}$
10) $-2(27)^{\frac{1}{3}}$	11) $\sqrt[3]{x} \cdot \sqrt[3]{x} \cdot \sqrt[3]{x}$	12) $(\sqrt[3]{x})^3$