Name:_____ Hour: _____ Date: _____

NOTES: Section 5.1 – Use Properties of Exponents

Goals: #1 - I can simplify an expression using the properties of exponents and explain my reasoning using these properties.

#2 - I use the properties of exponents to write an expression for a figure's area or volume in terms of x.
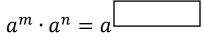
Homework: Lesson 5.1 Worksheet

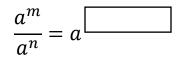**Exploration #1:** Work with a partner and answer the following questions.

1. What happens when you multiply two powers with the same base? Write the product using exponents.

   a. $(2^2)(2^3) =$

   b. $(x^2)(x^6) =$

   c. Write a general rule for finding the product of two powers with the same base.

$$a^m \cdot a^n = a^{\boxed{}}$$

2. What happens when you divide two powers with the same base? Write the quotient using exponents.

   a. $\dfrac{2^5}{2^2} =$

   b. $\dfrac{x^6}{x^3} =$

   c. Write a general rule for finding the quotient of two powers with the same base.

$$\frac{a^m}{a^n} = a^{\boxed{}}$$

3. What happens when you find a power of a power? Write the expression using exponents.

   a. $(2^2)^4 =$

   b. $(x^3)^3 =$

   c. Write a general rule for finding a power of a power.

$$(a^m)^n = a^{\boxed{}}$$

4. What happens when you find a power of a product? Write the expression using exponents.

    a. $(5 \cdot 4)^3 =$ b. $(3x)^2 =$

    c. Write a general rule for finding a power of a product.

$$(a \cdot b)^m = a^{\square} \, b^{\square}$$

5. What happens when you find a power of a quotient? Write the expression using exponents.

    a. $\left(\frac{2}{3}\right)^2 =$ b. $\left(\frac{x}{2}\right)^2 =$

    c. Write a general rule for finding the quotient of two powers with the same base.

$$\left(\frac{a}{b}\right)^m = \frac{a^{\square}}{b^{\square}}$$

6. Evaluate the following exponents:

    a. $10^1 =$ b. $10^2 =$ c. $10^3 =$ d. $10^0 =$

Use your calculator to evaluate the following exponents and write your answer as FRACTIONS :

    a. $10^{-1} =$ b. $10^{-2} =$ c. $10^{-3} =$

    d. Write a general rule for finding negative powers.

$$a^{-m} = \frac{1}{a^{\square}}$$

    e. Write a general rule for finding powers of 0.

$$a^0 = \square$$

Properties of Exponents:

Property:	Algebraic Expression:	Example:
Product of Powers Property		
Power of a Power Property		
Power of a Product Property		
Negative Exponent Property		
Zero Exponent Property		
Quotient of Powers Property		
Power of a Quotient Property		

Name:_____ Hour: _____ Date: _____

Example #1: Evaluate the expression. Write your answer using exponents <u>and</u> as a simplified fraction. NO DECIMALS.

1. 3^{-4}

2. $(2^8)^2$

3. $\left(\frac{1}{2}\right)^{-3}$

You practice: Evaluate the expression. Write your answer using exponents <u>and</u> as a simplified fraction. NO DECIMALS.

1. $(3^{-2})^3$

2. $\frac{8^{-4}}{8^{-6}}$

3. $(-2)^3 \cdot (-2)^6$

4. $[(-4)^3]^2$

5. $\frac{5}{2^{-3}}$

6. -100^0

Example #2: Simplify the expression. Evaluate all integers to powers. NO DECIMALS.

1. $(2d^5e^{-2})^{-3}$

2. $\frac{(2e)^{-4}g^5}{e^5g^{-3}}$

3. $\frac{x^{-4}y^3}{3y^{-2}} \cdot \frac{y^3}{x^4}$

You practice: Simplify the expression. Evaluate all integers to powers. NO DECIMALS.

1. $\left(\frac{s^3}{t^{-4}}\right)^{-2}$

2. $(7y^2z^5)(y^{-4}z^{-1})$

3. $\frac{(x^{-3}y^3)^2}{x^5y^6}$

4. $\left(\dfrac{a^2 b^{-1}}{2a^3 b^2}\right)^3$

5. $\left(\dfrac{6x}{y^2}\right)^{-2} \cdot 12x^4 y^{-10}$

6. $\dfrac{2x^{-8} y^5 z^{-7}}{4x^{-2} y^5 z^{-8}}$

Example #3: Write an expression for the figure's area of volume in terms of x.

1. $V = \pi r^2 h$