## **Lesson 44 POWER TO POWER RULE**

Date: \_\_\_\_\_

## **III. RAISING A POWER TO A POWER**

$$(5^3)^2 = (5 \cdot 5 \cdot 5)^{\square} = \underline{\qquad}$$

How did you get from the first expression to the last expression?

**Rule #3:** When raising a power to a power, keep the base and **multiply** the exponents.

Ex:

$$(4^2)^5 = 4^{10}$$

$$(x^3)^7 = x^{21}$$

<u>Directions</u>: Write an equivalent expression for the following problems.

1) 
$$(8^5)^9 =$$

3) 
$$\left(\frac{2}{3}\right)^4 =$$

5) 
$$(x^3)^6 =$$

2) 
$$(3^6)^2 =$$

4) 
$$(7^{-6})^{-8} =$$

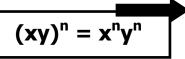
$$6) \left(\frac{1}{5}\right)^3 =$$

$$(n^{\square})^4 = n^{O}$$

Sarah wrote that  $(3^5)^7 = 3^{12}$ . Correct her mistake. Write an exponential expression using a base of 3 and exponents of 5, 7, and 12 that would make her **answer correct**.

## **Bases with Variables and Numbers:**

## For any numbers x and y, and positive integer n, $(xy)^n = x^n y^n$ **Try these:**



Ex: 
$$(4x^2)^3 = 64x^6$$

$$(x^3y^4)^2 = x^6y^8$$

<u>Directions</u>: Write an equivalent expression for the following problems.

9) 
$$(2x^5)^4 =$$
\_\_\_\_\_

9) 
$$(2x^5)^4 =$$
 10)  $(x^2y^4)^3 =$  11)  $(9x)^2 =$ 

11) 
$$(9x)^2 =$$
\_\_\_\_\_

12) 
$$(ab^3)^2 =$$
\_\_\_\_\_

13) 
$$(5x^2yz^3)^2 =$$
\_\_\_\_\_

14) Simplify the following expression completely. **Apply exponent rules**. Show work.

$$(4-1)^7 \div 3^5 + (2^3)^2 - 1^{10}$$