

# Lesson 44 POWER TO POWER RULE

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

## III. RAISING A POWER TO A POWER

$$(5^3)^2 = (5 \cdot 5 \cdot 5)^{\square} = \underline{\hspace{4cm}} = \underline{\hspace{4cm}}$$



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:

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

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

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

7) Fill in the box with the missing number:

$$(n^{\square})^4 = n^0$$

8) 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  $n$ ,  
Try these:

$$(xy)^n = x^n y^n$$

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

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

Directions: Write an equivalent expression for the following problems.

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

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

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

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