Name_____ Date_____

Mrs. Roumbos 8R Period_____

Properties of Exponents
Day 1

I. Exponents

In X^a : x is the_____ a is the _____

Examples:
1) Which is the base and which is the exponent of 5^3? 5 is the _____ & 3 is the _____.

2) Evaluate the following: a) 2^4 =_____ b) 6^4 =_____ c) 8^2 =_____

II. Exponential vs. Expanded vs. Standard

$$4^3 = 4 \cdot 4 \cdot 4 = 64$$

Examples:
1) Write the following in expanded form

a) 2^6=_____ b) x^3=_____ c) 7^2=_____

2) Write the following in exponential form

a) $3 \cdot 3 \cdot 3 \cdot 3$ =_____ b) $y \cdot y \cdot y$ =_____ c) $4 \cdot 4 \cdot 4 \cdot x \cdot x$ =_____

III. Negative bases
*You have to be very careful when working with exponents whose bases are negative

* A negative base with an even exponent equals a positive number

$$(-3)^2 = (-3) \cdot (-3) = 9$$

* A negative base with an odd exponent equals a negative number

$$(-3)^3 = (-3) \cdot (-3) \cdot (-3) = -27$$

* A base with a negative sign in front equals a negative number

$$-3^3 = -(3 \cdot 3 \cdot 3) = -27 \qquad -9^2 = -(9 \cdot 9) = -81$$

Examples: Simplify the following

1) -5^2 2) $(-6)^2$ 3) $(-8)^3$ 4) -2^4

IV. Zero & Negative exponents

5^4	5^3	5^2	5^1	5^0	5^{-1}	5^{-2}	5^{-3}	5^{-4}

2^4	2^3	2^2	2^1	2^0	2^{-1}	2^{-2}	2^{-3}	2^{-4}

The Zero Power		
Words	Numbers	Algebra
The Zero power of any number (except 0) is 1.	$100^0 =$ $5^0 =$ $-5^0 =$	$a^0 = 1$ if $a \neq 0$

Examples: Simplify the following

1) $7^0 =$

2) $15^0 =$

3) $8^0 =$

4) $x^0 =$

5) $(-10)^0 =$

6) $-10^0 =$

7) $\left(\frac{1}{3}\right)^0$

8) $(4x)^0 =$

9) $4x^0 =$

Negative Exponents		
Words	Numbers	Algebra
Any non-zero number raised to a negative power equals 1, divided by that number raised to the positive power (reciprocal)	$5^{-3} =$ $2^{-2} =$	$b^{-n} = \frac{1}{b^n}$ if $b \neq 0$

Examples: Simplify

1) $10^{-2} =$

2) $x^{-7} =$

3) $2^{-6} =$

4) $(-3)^{-4} =$

5) $y^{-3} =$

6) $(-2)^{-5} =$

V. Mixed Examples

1) $6^{-4} =$

2) $12^{0} =$

3) $8^{-1} =$

4) $b^{-3} =$

5) $347^{0} =$

6) $15^{-2} =$

7) $20^{-2} =$

8) $a^{-5} =$

9) $0^{1} =$