AChor/MPM1D   Name: _____

                                     Date: _____

Worksheet 2-6: Zero and Negative Exponents Investigation

The following tables show the descending powers (decreasing powers) of 2 and 10.

1. For the following tables, evaluate each power with the aid of a scientific calculator.

Power Form	Standard Form	Fraction Form	Denominator as a Power	Power Form	Standard Form	Fraction Form	Denominator as a Power
2^4	16	16	–	10^4	10000	10000	–
2^3				10^3			
2^2				10^2			
2^1				10^1			
2^0				10^0			
2^{-1}				10^{-1}			
2^{-2}				10^{-2}			
2^{-3}				10^{-3}			
2^{-4}	0.0625	$\dfrac{1}{16}$	$\dfrac{1}{2^4}$	10^{-4}	0.0001	$\dfrac{1}{10000}$	$\dfrac{1}{10^4}$

2. Compare your answer for 2^0 and 10^0. What is the common pattern for any power with a zero exponent, a^0?

3. Compare your answer for 2^1 and 10^1. What is the pattern for any power with exponent "1", a^1?

4. Compare your answers for negative exponents of 2 and 10. Are they negative or positive?

5. After writing the denominator of each fraction as a power of 2 or 10, what is the pattern for powers with negative exponents, a^{-n}?

6. Use your conclusions to Question 3 to 5 to evaluate $345^0, 100^1$ and 8^{-2}.

Assigned Work: WS 2-6; Handout "Exponent Law Practice"

Conclusion:

Exponent Law 4 - The Zero Exponent Rule

$$a^0 =$$

where $a \neq 0$

Exponent Law 5 - The Exponent "1" Rule

$$a^1 =$$

Exponent Law 6 - The Negative Exponent Rule

$$a^{-n} =$$

where $a \neq 0$

****We always simplify with positive exponents****

Practice:

1. **Simplify the following powers.**

   (a) 12^0 (b) 5^1 (c) 523515^0 (d) x^1

2. **Write the following as a single power with positive exponent(s).**

   (a) 11^{-2} (b) 4^{-3} (c) 123^{-1} (d) 3^{-4}

3. **Simplify then evaluate the following for $x = 3$ and $y = 4$.**

   (a) $\dfrac{x^3 y^2}{x^2}$ (b) $\dfrac{x^1 y^2}{x^0}$ (c) $x^{-2} + y^{-1}$

Answers: 1. (a) 1, (b) 5, (c) 1, (d) x **; 2.** (a) $\dfrac{1}{11^2}$, (b) $\dfrac{1}{4^3}$, (c) $\dfrac{1}{123^1}$, (d) $\dfrac{1}{3^4}$ **; 3.** (a) xy^2, 48, (b) xy^2, 48, (c) $\dfrac{13}{36}$.