Algebra 1 – Unit 8 Date: _____

Laws of Exponents - Zero and Negative NOTES

Exponent of Zero	Any term (except 0) raised to the power of 0 equals **ONE**.

Examples:

$x^0 = 1$ $(xy)^0 = 1$ $(4y)^0 = 1$ $\left(\frac{x}{y}\right)^0 = 1$

$2x\left(\frac{x}{y}\right)^0 = 2x$ $2x(1)$ $\frac{(xy)^0}{4} = \frac{1}{4}$ $\frac{2m^0n^2}{xy} = \frac{2n^2}{xy}$ $\frac{12xz^2}{x^0 6z} = \frac{2xz^2}{1}$ $2xz^2$

$\frac{z^2z^2}{z} = zzz$

Negative Exponents	A power with a negative exponent is the **RECIPROCAL** of the same power with a positive exponent.

Example: x^{-3} written as a fraction would be $\frac{x^{-3}}{1} = \frac{1}{x^3}$

Move the term with the negative exponent to the other part of the fraction and make the exponent positive.

$x^{-5} = \frac{1}{x^5}$ $2^{-4} = \frac{1}{2^4} = \frac{1}{16}$ $m^{-5} = \frac{1}{m^5}$ $4^{-2} = \frac{1}{4^2} = \frac{1}{16}$

Practice:

$y^{-8} = \frac{1}{y^8}$ $z^{-5} = \frac{1}{z^5}$ $q^{-10} = \frac{1}{q^{10}}$ $w^{-7} = \frac{1}{w^7}$

Example: $\frac{1}{b^{-2}} = b^2$

$\frac{1}{c^{-3}} = c^3$ $\frac{1}{x^{-2}} = x^2$ $\frac{1}{r^{-5}} = r^5$ $\frac{1}{d^{-9}} = d^9$

Practice:

$\frac{1}{p^{-7}} = p^7$ $\frac{1}{j^{-19}} = j^{19}$ $\frac{1}{6^{-2}} = 6^2 = 36$ $\frac{1}{2^{-9}} = 2^9 = 512$

Simplify each expression.

$x^{-3} \cdot x^2$ $x^{-3+2} = x^{-1} = \frac{1}{x^1} = \frac{1}{x}$ $m^4 \cdot 2m^{-3} = 2m^{4+(-3)} = 2m^1 = 2m$

$(x^2)^0 = 1$ $(2x^2)^{-4} = 2^{-4}x^{-8} = \frac{1}{2^4x^8} = \frac{1}{16x^8}$

$(4x^0)^4 = (4)^4 = 256$ $(4xy)^{-1} = 4^{-1}x^{-1}y^{-1} = \frac{1}{4^1x^1y^1} = \frac{1}{4xy}$

$\frac{3m^{-4}}{m^3} = \frac{3}{m^3m^4} = \frac{3}{m^7}$ $\frac{4x^2}{x^{-4}y^0z^0} = \frac{4x^2x^4}{1} = 4x^6$

$\left(\frac{x^2y^5}{x^5 \cdot x^{-2}y^2}\right)^3$

$\left(\frac{x^2y^5}{x^3y^2}\right)^3$

$\left(\frac{y^3}{x^1}\right)^3 = \frac{y^9}{x^3}$

$\left(\frac{2x^{-3}y^2}{4x^6y^{-3}}\right)^{-2}$

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

$\left(\frac{y^5}{2x^3}\right)^{-2} = \frac{y^{-10}}{2^{-2}x^{-6}} = \frac{2^2x^6}{y^{10}} = \frac{4x^6}{y^{10}}$