Negative Exponents

with a negative exponent:

reciprocal of the base to the opposite exponent

$a^{-n} = (^1/_a)^n$

Proof:

$\div 2 \uparrow$

$2^{-2} = 1/4$

$2^{-1} = 1/2$

$2^{0} = 1$

$2^{1} = 2$

$2^{2} = 4$

$2^{3} = 8$

$2^{4} = 16$

$\downarrow * 2$

$2^{-3} = \frac{1}{8}$ $\quad 2^{3} = 8$

$2^{-4} = 1/16$ $\quad 2^{4} = 16$

Ex:

$2^{-2} = (½)^2 = ¼$ $\qquad 2^{-3} = (½)^3 = ⅛$

$(½)^{-2} = 2^2 = 4$ $\qquad (-2)^{-3} = (-½)^3 = -⅛$

$(-2)^{-2} = (-½)^2 = ¼$ $\qquad (½)^{-3} = 2^3 = 8$

$(-½)^{-2} = (-2)^2 = 4$ $\qquad (-½)^{-3} = (-2)^3 = -8$

<u>Zero Exponent Law</u>:

$a^0 = 1 \quad a \neq 0$

any non-zero number raised to zero exponent = 1

<u>proof</u>:

$2^{-2} = \frac{1}{4}$	$3^{-2} = 1/9$
$2^{-1} = \frac{1}{2}$	$3^{-1} = \frac{1}{3}$
$2^0 = 1$	$3^0 = 1$
$2^1 = 2$	$3^1 = 3$
$2^2 = 4$	$3^2 = 9$
$2^3 = 8$	$3^3 = 27$
$2^4 = 16$	$3^4 = 81$

$$1 = \frac{2^2}{2^2} = 2^{2-2} = 2^0$$