Simplify powers with a negative exponent: ER6

reciprocal of the base to the opposite exponent → positive

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

Proof:

$$2^{-3} = \frac{2^2}{2^5} = \frac{\cancel{2}\cdot\cancel{2}}{\cancel{2}\cdot\cancel{2}\cdot 2\cdot 2\cdot 2} = \frac{1}{2^3} = \frac{1}{8}$$

Ex:

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

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

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

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

9R6

Zero Exponent Law:

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

any non-zero number raised to zero exponent = 1

(0º = undefined, 0^{-n} = undefined)

$2^{-3} = 1/8$
$2^{-2} = 1/4$
$2^{-1} = 1/2$
$2^{0} = 1$
$2^{1} = 2$
$2^{2} = 4$
$2^{3} = 8$
$2^{4} = 16$

Proof:

$$1 = 1^3 = \frac{2^3}{2^3} = 2^0$$