Rules for Exponents

Term

In mathematics a term is a single number or variable, or numbers and variables multiplied together. They are separated by addition and subtraction



When multiplying two like bases, rewrite the base and add the exponents.

Coefficients are still multiplied

$x^{2}\*x^{3}=x^{5}$ $2j^{2}\*6j^{4}=12j^{6}$

$$x^{5}y\*x^{3}y^{3}=x^{8}y^{4}$$

$$x^{m}\*x^{n}=x^{m+n}$$

When dividing two like bases, rewrite the base and subtract the exponents.

Coefficients are still divided

$$\frac{x^{5}}{x^{2}}=x^{3} \frac{15x^{3}}{3x}=5x^{2}$$

$$\frac{m^{5}w^{3}}{m^{2}w^{2}}=m^{3}w$$

$$\frac{x^{m}}{x^{n}}=x^{m-n}$$

$$x^{0}=1$$

Any nonzero number raised to the zero power is equal to one

$$y^{0}=1 (15x^{-1}y^{15}z^{5})^{0}=1$$

$$0^{0}=???$$

A power raised to a power is multiplied, coefficients are still raised to the exponent outside of the parenthesis.

$$2x^{3}\ne (2x)^{3}$$

$(x^{2})^{4}=x^{8}$ $(x^{3}y^{2})^{4}=x^{12}y^{8}$

$$(3x^{2})^{3}=27x^{6}$$

$$(x^{m})^{n}=x^{m\*n}$$

$$ \left(\frac{x}{y} \right)^{m}=\frac{x^{m}}{y^{m}}$$

Distribute exponents to numerators and denominators

$$ \left(\frac{x^{4}}{y} \right)^{2}=\frac{x^{8}}{y^{2}} \left(\frac{2x^{3}}{3y^{2}} \right)^{3}=\frac{8x^{9}}{9y^{6}}$$

$$ \left(\frac{x}{y} \right)^{-m}=\frac{y^{m}}{x^{m}}$$

$$\frac{1}{x^{-m}}=x^{m}$$

If the negative exponent is outside of a fraction, take the reciprocal (flip) and change the signs.

$$ \left(\frac{x}{y} \right)^{-2}=\frac{y^{2}}{x^{2}} \left(\frac{4x}{2y} \right)^{-3}=\frac{8y^{3}}{64x^{3}}$$

If the negative exponent is on the bottom of a fraction, it inverts and comes to the top.

$$\frac{1}{x^{-5}}=x^{5} \frac{5}{x^{-2}} =5x^{2} \frac{y^{2}}{x^{-2}}=x^{2}y^{2}$$

$$x^{-m}=\frac{1}{x^{m}}$$

Negative exponents mean to invert. Put the term on the bottom of a fraction and remove the negative side.

$$x^{-5}=\frac{1}{x^{5}} 5x^{-2}=\frac{5}{x^{2}} x^{-2}y^{2}=\frac{y^{2}}{x^{2}}$$