

Exponents

Multiplication: $(a^m)(a^n) = a^{m+n}$; if the bases are the same, rewrite the base and add the exponents.

Rule: If there are coefficients in front of the base, you must multiply the coefficients.

$$\text{ex: } (2x^3)(4x^2) = 8x^5$$

Division: $\frac{a^m}{a^n} = a^{m-n}$; if the bases are the same, rewrite the base and subtract the exponents.

Rule: If there are coefficients in front of the base, you must divide the coefficients.

$$\text{ex: } \frac{4x^5}{2x^2} = \frac{4}{2} x^{5-2} = 2x^3$$

Negative: $a^{-n} = \frac{1}{a^n}$ when $a \neq 0$; if you have a negative exponent, rewrite the expression

with a positive exponent and put it in the denominator if it was in the numerator, or in the numerator if it was in the denominator.

$$\text{ex: } \frac{5x^{-2}y^3}{-4x^3y^{-4}} = \frac{5y^3y^4}{-4x^3x^2} = \frac{5y^{3+4}}{-4x^{3+2}} = \frac{5y^7}{-4x^5}$$

Exponents raised to another exponent: $(a^m)^n = a^{m \cdot n}$; when you have an exponent raised to another exponent, you rewrite the base and multiply the exponents.

$$\text{ex: } (-2m^4n^2)^3 = -2^3m^{12}n^6$$

Fractional Exponents: $a^{m/n} = (a^m)^{1/n} = \sqrt[n]{a^m}$ where $n \geq 2$. When given a fractional exponent, the numerator of the fraction is the power and the denominator is the root.

$$\text{ex: } x^{5/4} = \sqrt[4]{x^5} \text{ or } (\sqrt[4]{x})^5$$

Zero: $a^0 = 1$, where $a \neq 0$. Whenever there is a nonzero base raised to the zero power, the value is always one.