

# Exponent Properties

## 1. Product of like bases:

$$a^m a^n = a^{m+n}$$

To multiply powers with the same base, add the exponents and keep the common base.

*Example:*  $x^5 x^3 = x^{5+3} = x^8$

## 2. Quotient of like bases:

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

To divide powers with the same base, subtract the exponents and keep the common base.

*Example:*  $\frac{x^5}{x^3} = x^{5-3} = x^2$

## 3. Power to a power:

$$(a^m)^n = a^{mn}$$

To raise a power to a power, keep the base and multiply the exponents.

*Example:*  $(x^5)^3 = x^{5 \cdot 3} = x^{15}$

## 4. Product to a power:

$$(ab)^m = a^m b^m$$

To raise a product to a power, raise each factor to the power.

*Example:*  $(x^4 y^5)^3 = x^{12} y^{15}$

## 5. Quotient to a power

$$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$$

To raise a quotient to a power, raise the numerator and the denominator to the power.

*Example:*  $\left(\frac{x^3}{y^2}\right)^4 = \frac{x^{12}}{y^8}$

## 6. Zero Exponent:

$$a^0 = 1$$

Any number raised to the zero power is equal to "1".

*Example:*  $(8x^4)^0 = 1$

## 7. Negative exponent:

$$a^{-n} = \frac{1}{a^n} \quad \text{or} \quad \frac{1}{a^{-n}} = a^n$$

Negative exponents indicate reciprocation, with the exponent of the reciprocal becoming positive. You may want to think of it this way: unhappy (negative) exponents will become happy (positive) by having the base/exponent pair "switch floors"!

*Example:*  $8^{-2} = \frac{1}{8^2} = \frac{1}{64}$       *or*       $\frac{4}{x^{-3}} = 4x^3$