

Exponent Rules

Product Rule

When multiplying powers with the same base, add their exponents.

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

Examples:

$$x^3 \cdot x^4 = x^7$$
$$2^3 \cdot 2^4 = 2^7 = 128$$

Quotient Rule

When dividing powers with the same base, subtract their exponents.

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

Examples:

$$\frac{x^7}{x^3} = x^4$$
$$\frac{2^7}{2^3} = 2^4 = 16$$

Power to a Power Rule

When a power is raised to another power, multiply the exponents.

$$(a^m)^n = a^{m \cdot n}$$

Examples:

$$(x^3)^4 = x^{12}$$
$$(2^3)^4 = 2^{12} = 4,096$$

Power of a Product/Quotient Rule

When a product or quotient is raised to a power, each factor should be raised to that power.

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

Examples:

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

Negative Exponent Rule

When a base has a negative exponent, bring the power to the denominator and make the exponent positive.

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

Examples:

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

Zero Exponent Rule

Anything (except 0) raised to the power of 0 is equal to 1.

$$a^0 = 1$$

Examples:

$$x^0 = 1$$
$$5,820,653^0 = 1$$

