

THE RULES OF EXPONENTS

THE BASICS OF EXPONENTS



Example

2^3 · 2 is the base
· 3 is the exponent

Read as "Two to the third power"

PRODUCT RULE

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

When multiplying exponents with the **same base**, **add** the exponents.

Examples

A. $x^3 \cdot x^5 = x^{3+5} = x^8$

B. $3^2 \cdot 3^3 = 3^{2+3} = 3^5$

QUOTIENT RULE

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

When dividing exponents with the **same base**, **subtract** the exponents.

Examples

A. $\frac{x^4}{x^2} = x^{4-2} = x^2$ B. $\frac{3^5}{3^2} = 3^{5-2} = 3^3$

POWER to a POWER

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

When raising a power to a power, keep the base and **multiply** the exponents.

Examples

A. $(x^5)^4 = x^{5 \cdot 4} = x^{20}$

B. $(2^2)^3 = 2^{2 \cdot 3} = 2^6 = 64$

POWER of a QUOTIENT

$$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n} \quad \text{when } b \neq 0$$

When raising a quotient to a power, distribute the exponent to the numerator and denominator. Then simplify the expression.

Examples

A. $\left(\frac{x}{y}\right)^5 = \frac{x^5}{y^5}$ B. $\left(\frac{2}{3}\right)^3 = \frac{2^3}{3^3} = \frac{8}{27}$

POWER of a PRODUCT

$$(ab)^n = a^n \cdot b^n$$

When raising a product to a power, distribute the exponent to each factor in the product. Then simplify the expression.

Examples

A. $(xy)^3 = x^3y^3$

B. $(3 \cdot 4)^2 = 3^24^2 = 9 \cdot 16 = 144$

THE ZERO RULE

$$a^0 = 1$$

Any number raised to the zero power is always **one**.

Example

$$2^0 = 1$$