

Zero Exponents

A number, to an exponent of 0, equals 1.
 $a^0 = 1$

Example

$$\left(\frac{5}{3}\right)^2 = \frac{5^2}{3^2} = \frac{25}{9}$$

Powers With Rational Bases

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

Exponential Form

base $\rightarrow 5^3 \leftarrow$ exponent

Repeated multiplication of the same number by itself can be expressed as a power.

Expanded Form

$$5 \times 5 \times 5$$

Rule:

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

Example:

$$5^{-2} = \frac{1}{5^2} = \frac{1}{25}$$

Negative Exponents

A number to a negative exponent, is the reciprocal of the base to the positive exponent

Exponents

Quotient Rule

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

Rule:

$$\frac{a^b}{a^c} = a^{b-c}$$

Example

$$\frac{x^9}{x^3} = x^6$$

Product Rule:

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

Rule:

$$a^b \times a^c = a^{b+c}$$

Example:

$$3^2 \times 3^3 = 3^5 = 243$$

Power of a Power Rule:

To raise a power to another exponent, keep the base the same and **multiply** the exponents

Rule:

$$(a^b)^c = a^{b \times c}$$

Example:

$$(x^3)^5 = x^{15}$$