

# Properties of Exponents

Let  $a$  and  $b$  be real numbers, and let  $m$  and  $n$  be integers.

## Product of Powers

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

When multiplying exponents with similar bases, you add the exponents.

## Quotient of Powers

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

When dividing exponents with similar bases, you subtract the exponents.

## Power of a Power

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

When you have an exponent raised to another power, you multiply the powers.

## Power of a Product

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

When raising multiple bases to a power, all bases get the power.

## Power of a Quotient

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

When raising a fraction to a power, both the numerator and the denominator are raised to the power.

## Negative Exponent

$$a^{-m} = \frac{1}{a^m} \text{ and } \frac{1}{a^{-m}} = a^m, a \neq 0$$

When you have a negative exponent, you make a fraction with the base becoming the denominator and having a positive exponent.

## Negative Base

$$(-3)^2 = 9, \text{ and } -3^2 = -9$$

When raising a negative base inside parenthesis, you raise the negative number to a power. A negative sign not inside parenthesis is not raised.

## Zero Exponent

$$a^0 = 1, a \neq 0$$

For all bases (Except zero), an exponent of zero makes the term equal to 1.