

The Exponent Laws

Rule	English Description	Algebraic Description
Zero as an Exponent	When an exponent is zero, the value of the power is 1.	$x^0 = 1, x \neq 0$
Negative Exponents	When an exponent is negative take the reciprocal of the base and make the exponent positive.	$x^{-n} = \frac{1}{x^n}, x \neq 0$ $\left(\frac{x}{y}\right)^{-n} = \left(\frac{y}{x}\right)^n$
Multiplication	When multiplying exponents with the same base, keep the base and add the exponents.	$x^n \times x^m = x^{n+m}$
Division	When dividing exponents with the same base, keep the base and subtract the exponents.	$x^n \div x^m = x^{n-m}, x \neq 0$ $\frac{x^n}{x^m} = x^{n-m}, x \neq 0$
Power of a Power	When raising an exponent to an exponent, keep the base and multiply the exponents.	$(x^n)^m = x^{n \times m}$
Power of a Product	A product raised to a power is equivalent to the product of each factor raised to the same power.	$(xy)^n = x^n y^n$
Power of a Quotient	A quotient raised to a power is equivalent to the quotient of the numerator and the denominator each raised to the same power.	$\left(\frac{x}{y}\right)^n = \frac{x^n}{y^n}, y \neq 0$
Rational Exponents	When an exponent is a fraction, its denominator indicates the degree of the root.	$x^{\frac{1}{n}} = \sqrt[n]{x}, x \geq 0$ if n is even $x^{\frac{m}{n}} = \sqrt[n]{x^m} = \sqrt[n]{x^m}, x \geq 0$ if n is even $x^{-\frac{m}{n}} = \frac{1}{\sqrt[n]{x^m}}, x \neq 0, x > 0$ if n is even