

Exponent Rules

	Name	Definition	Explanation
Property 1	Multiplying Powers with Like Bases	If m and n are positive integers and a is a real number, then $a^m \cdot a^n = a^{m+n}$	To multiply two exponential expressions with the same (or common) base, keep the base and ADD the exponents.
Property 2	Dividing Powers with Like Bases	If m and n are positive integers and a is a real number, then $\frac{a^m}{a^n} = a^{m-n}$	To divide two exponential expressions with the same (or common) base, subtract their exponents. The base stays the same.
Property 3	Raising a Power to a Power	If m and n are positive integers and a is a real number, then $(a^m)^n = a^{m \cdot n}$	To raise a power to a power, MULTIPLY the exponents.
Property 4	Raising a Product to a Power	If n is a positive integer and a and b are real number, then $(ab)^n = a^n b^n$	To raise a product to a power, you can first raise each factor to the power. Then multiply.
Property 5	Raising a Quotient to a Power	If n is a positive integer and a and b are real number, then $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$	To raise a quotient to a power, you can first raise the numerator and denominator each to the power. Then divide.
Property 6	Definition of a^0 (Zero Exponent)	Let a be a nonzero real number, Then $a^0 = 1$, as long as a is not 0.	Any real number, except zero, raised to the power 0 is 1.
Property 7	Definition of a^{-n} (Negative Exponent)	Let n be an integer and a be a nonzero real number. Then, $a^{-n} = \frac{1}{a^n}$	Take the reciprocal of the base and change the sign of the exponent.

Example 3: Use the properties of exponents to simplify the expression. Write with positive exponents. Assume that all variables represent positive real numbers.