



Objective 5 TEKS A.11.A Review

A.11.A Use patterns to generate the laws of exponents and apply them in problem-solving situations.

You can use properties and rules for exponents to simplify algebraic expressions.

The properties and rules in the chart are true for all real numbers a and b and for integers m and n .

Property or Rule	General Statement	Example
Product of Powers Property	$a^m \cdot a^n = a^{m+n}$	$x^4 \cdot x^3 = x^{4+3} = x^7$
Quotient of Powers Property	$\frac{a^m}{a^n} = a^{m-n}, a \neq 0$	$\frac{x^5}{x} = x^{5-1} = x^4$
Power of a Power Property	$(a^m)^n = a^{m \cdot n}$	$(2^2)^5 = 2^2 \cdot 5 = 2^{10} = 1024$
Power of a Product Property	$(a \cdot b)^m = a^m \cdot b^m$	$(-3w)^2 = (-3)^2 \cdot w^2 = 9w^2$
Power of a Quotient Property	$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}, b \neq 0$	$\left(\frac{d}{2}\right)^3 = \frac{d^3}{2^3} = \frac{d^3}{8}$
A nonzero number to the zero power is 1.	$a^0 = 1, a \neq 0$	$(-8)^0 = 1$
a^{-n} is the reciprocal of a^n .	$a^{-n} = \frac{1}{a^n}, a \neq 0$	$6^{-3} = \frac{1}{6^3} = \frac{1}{216}$

EXAMPLE How can you demonstrate that $y^4 \cdot y^2 = y^6$? How does the product of powers property support your reasoning?

Statement	Reason
$y^4 \cdot y^2 = (y \cdot y \cdot y \cdot y) \cdot (y \cdot y)$	Multiply 4 factors of y by 2 factors of y .
$= y \cdot y \cdot y \cdot y \cdot y \cdot y$	There are 6 factors of y .
$= y^6$	Write the expression in exponential form.
Using the product of powers property, $y^4 \cdot y^2 = y^{4+2} = y^6$.	

YOU DO IT How can you show that $(3x^4)(x^2y^5)^3(z)^0 = 3x^{10}y^{15}$?

Statement	Reason
$(3x^4)(x^2y^5)^3(z)^0 = (3x^4)(x^2y^5)^3$	$(z)^0 = \underline{1}$ and
$= 3x^4 \cdot x^6y^{\underline{15}}$	$(3x^4)(x^2y^5)^3(1) = (3x^4)(x^2y^5)^3$
$= 3 \cdot (x^4 \cdot \underline{x^6}) \cdot y^{15}$	Power of a power property
$= 3x^{\underline{10}}y^{15}$	Associative property of multiplication
	Product of powers property