Properties of Exponents (review)

Activity 1. Fill in the gaps using the following words: power, base, exponent, degree, multiplied

An exponent (also called power or ________) tells us how many times the base will be _________ by itself.
For example x^5 : the _________ is 5 and the ________ is x. This means that the variable x will be multiplied by itself 5 times. You can also think of this as 5 to the fifth _________ .

Activity 2. Complete the following list of properties of exponents:

Properties	General Form	Application	Example
Product Rule *Same base add exponents*	$a^m a^n$	a^{m+n}	$x^5 x^3 = x^{5+3} = x^8$
Quotient Rule *Same base subtract exponents*	$\frac{a^m}{a^n}$		$\frac{x^9}{x^5} = x^{9-5} = x^4$
Power Rule I *Power raised to a power multiply exponents.*	$(a^m)^n$		$(x^3)^4 = x^{3 \cdot 4} = x^{12}$
Power Rule II *Product to power distribute to each base*		$a^m b^m$	$(4x^3)^2 = 4^2 x^{3 \cdot 2} = 16x^6$
Negative Exponent I *Flip and change sign to positive*	a^{-m}		$x^{-3} = \frac{1}{x^3}$
Negative Exponent II *Flip and change sign to positive*	$\frac{1}{a^{-m}}$		$\frac{1}{x^{-5}} = x^5$
Zero Exponent *Anything to the zero power (except 0) is one*	a^0	$a^0 = 1$	$(-4x)^0 = 1$

It is important to note that none of these applications can occur if the bases are not the same.

For example, $\frac{x^3}{y^4}$ cannot be simplified.

Using a Combination of Rules

At one point, you may be asked to use a combination of these properties.

Example:

- $\dfrac{\left(2^3y^2\right)^5}{2^{10}y^{16}}$ → Power Rule
- $\dfrac{2^{3\cdot 5}y^{2\cdot 5}}{2^{10}y^{16}}$
- $\dfrac{2^{15}y^{10}}{2^{10}y^{16}}$ → Quotient Rule
- $2^{15-10}y^{10-16}$
- 2^5y^{-6} → Negative Exponent
- $\dfrac{32}{y^6}$