TOPIC: SIMPLIFYING EXPONENTIAL EXPRESSIONS USING ALL EXPONENT RULES

CHAPTER RESOURCE: RULES OF EXPONENTS

EXPONENT RULES		
Name	**Rule**	**Description**
Product Rule	$a^m \times a^n = a^{m+n}$	*Multiply* terms w/ ***same base*** ⇒ **[ADD | SUBTRACT]** exp.
Quotient Rule	$\frac{a^m}{a^n} = a^{m-n}$	*Divide* terms w/ ***same base*** ⇒ **[ADD | SUBTRACT]** exp. ALWAYS **top** – **bottom**
Zero Exp. Rule	$a^0 = 1$	ANYTHING (except 0) raised to 0 exponent = 1
Power Rule	$(a^m)^n = a^{m \cdot n}$	*Power* to another power ⇒ multiply exponents
Power of a Product	$(a \cdot b)^m = a^m \cdot b^m$	***Distribute*** exponent to each factor in parenthesis
Power of a Quotient	$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$	***Distribute*** exponent to numerator AND denominator
Neg Exp Rule	$a^{-n} = \frac{1}{a^n}$ $\frac{1}{a^{-n}} = a^n$	Neg exp in ***top*** ⇒ flip to **[BOTTOM | TOP]** with pos exp Neg exp in ***bottom*** ⇒ flip to **[BOTTOM | TOP]** with pos exp

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Simplifying Exponential Expressions

◆ You'll often have to use multiple exponent rules to fully simplify expressions. Use this checklist!

► There's no "correct" order in using rules but *usually* it's easiest to simplify from inner-most expression outward.

EXAMPLE: Simplify the expressions.

(A) $(3x^{-5})^2 \cdot (-2x^4)^3$

(B) $\left(\frac{x^2y^7}{x^5y^4}\right)^{-1}$

Expressions are ***fully simplified*** when:	Name	Rule
✓ No powers raised to other powers	Power Rules	$(a^m)^n = a^{m \cdot n}$
		$(a \cdot b)^m = a^m \cdot b^m$
✓ No parentheses		$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$
✓ No same bases multiplied or divided (e.g. $x^2 \cdot x^4$, $\frac{y^7}{y^4}$)	Product & Quotient Rules	$a^m \times a^n = a^{m+n}$
		$\frac{a^m}{a^n} = a^{m-n}$
✓ No zero exponents	Zero Exp. Rule	$a^0 = 1$
✓ No negative exponents	Negative Exp. Rule	$a^{-n} = \frac{1}{a^n}$
✓ All numbers with exponents evaluated	Base 1	$1^n = 1$
	Neg to Even Power	$(-a)^{even} = a^{even}$
	Neg to Odd Power	$(-a)^{odd} = -a^{odd}$
✓ All operations ($\times, \div, +, -$) performed		