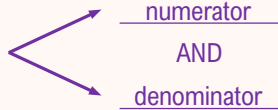


TOPIC: SIMPLIFYING EXPONENTIAL EXPRESSIONS USING ALL EXPONENT RULES

CHAPTER RESOURCE: RULES OF EXPONENTS

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

TOPIC: SIMPLIFYING EXPONENTIAL EXPRESSIONS USING ALL EXPONENT RULES

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.

| | | | |
|---|---|--------------------------|--|
| <p>EXAMPLE: Simplify the expressions.</p> <p>(A) $(3x^{-5})^2 \cdot (-2x^4)^3$</p> <p>(B) $\left(\frac{x^2y^7}{x^5y^4}\right)^{-1}$</p> | Expressions are fully simplified when: | Name | Rule |
| | ✓ No <u>powers</u> raised to other <u>powers</u> | Power Rules | $(a^m)^n = a^{m \cdot n}$ |
| | ✓ No <u>parentheses</u> | | $(a \cdot b)^m = a^m \cdot b^m$ |
| | ✓ No <u>same bases</u> multiplied or divided (e.g. $x^2 \cdot x^4$, $\frac{y^7}{y^4}$) | | $\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$ |
| | ✓ No <u>zero</u> exponents | Zero Exp. Rule | $a^0 = 1$ |
| | ✓ No <u>negative</u> exponents | Negative Exp. Rule | $a^{-n} = \frac{1}{a^n}$ |
| | ✓ All numbers with exponents <u>evaluated</u> | 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 | | |