

Monomials and Exponent Rules

Monomials

- A monomial is a number, variable, or a product of numbers and variables.
- Examples: 3, x, a², 2y³, 5x²y⁴
- Use the Exponent Rules to simplify monomial expressions.
- When adding or subtracting monomials, COMBINE LIKE TERMS!

Name	Rule	Example
Product Rule	$x^m \cdot x^n = x^{m+n}$	$x^4 \cdot x^3 = x^{4+3} = x^7$
Power Rule	$(x^m)^n = x^{mn}$	$(x^4)^3 = x^{4 \cdot 3} = x^{12}$
Quotient Rule	$\frac{x^m}{x^n} = x^{m-n}$	$\frac{x^4}{x^3} = x^{4-3} = x^1 = x$
Negative Exponent Rule	$x^{-m} = \frac{1}{x^m}$	$x^{-4} = \frac{1}{x^4}$
Zero Exponent Rule	$x^0 = 1$	$x^4 \cdot x^{-4} = x^{4-4} = x^0 = 1$

Directions: Simplify each expression.

1.) $5x^2 \cdot -7x^6$ $5 \cdot -7x^{2+6}$ $-35x^8$	2.) $(-2a^3b)^2$ $(-2)^2 a^{3 \cdot 2} b^{1 \cdot 2}$ $4a^6b^2$	3.) $\frac{54m^6n^4}{3m^2n}$ $\frac{54}{3} m^{6-2} n^{4-1}$ $18m^4n^3$
4.) $2k^4 \cdot 10k^{-7}$ $2 \cdot 10k^{4+(-7)}$ $20k^{-3}$ $20 \cdot \frac{1}{k^3} \Rightarrow \frac{20}{k^3}$	5.) $\frac{15x^{10}y^4}{24x^{12}y^3}$ $\frac{15}{24} x^{10-12} y^{4-3}$ $\frac{5}{8} x^{-2} y^1 \Rightarrow \frac{5y}{8x^2}$	6.) $(3x^3y)^2 \cdot 4x^{-6}y$ $(3)^2 x^{3 \cdot 2} y^{1 \cdot 2} \cdot 4x^{-6}y$ $9x^6y^2 \cdot 4x^{-6}y$ $9 \cdot 4 x^{6+(-6)} y^{2+1}$ $36x^0y^3 \Rightarrow 36y^3$
7.) $(2ab^2)^4 + 5a^4b^8$ $(2)^4 a^{1 \cdot 4} b^{2 \cdot 4} + 5a^4b^8$ $16a^4b^8 + 5a^4b^8$ $21a^4b^8$	8.) $(\frac{15}{3x})^{-2}$ $(\frac{5}{x})^{-2} \Rightarrow (\frac{x}{5})^2$ $\Rightarrow \frac{x^2}{25}$	9.) $\frac{18p^6q^3}{6p^5q^3} - 2p$ $\frac{18}{6} p^{6-5} q^{3-3} - 2p$ $3p^1q^0 - 2p$ $3p - 2p \Rightarrow p$