

Multiplying Monomials / Polynomials

Laws of Exponents Relating to Multiplication

When multiplying like bases, keep the _____ and _____.

$$x^a \cdot x^b = \underline{\hspace{2cm}}$$

Examples:

1) $x^2 \cdot x^3 = \underline{\hspace{1cm}}$ 2) $y^4 \cdot y \cdot y^5 = \underline{\hspace{1cm}}$ 3) $m^6 \cdot m^x = \underline{\hspace{1cm}}$ 4) $k^{3y} \cdot k^{5y} = \underline{\hspace{1cm}}$

Laws of Exponents Relating To Powers

When an exponent is applied to a power (a base with an exponent), the result is the same as if the exponents were _____.

$$(x^a)^b = \underline{\hspace{2cm}}$$

Examples:

1) $(x^2)^3 = \underline{\hspace{1cm}}$ 2) $(y^5)^4 = \underline{\hspace{1cm}}$ 3) $(m^{3x})^6 = \underline{\hspace{1cm}}$ 4) $(p^7)^x = \underline{\hspace{1cm}}$
5) $(f^3)^2 \cdot (f^4)^2 = \underline{\hspace{1cm}}$ 6) Find the volume of a rectangular prism whose length is x^2 , whose width is x , and whose height is x^3 .

For all numbers x, y, and integers, n

$$(xy)^n = x^n y^n$$

"Notice: each factor of the product gets raised to the new power."

Examples:

1) $(-3x^2)^3 = \underline{\hspace{1cm}}$ 2) $(2x)^2(-y^2)^3 = \underline{\hspace{1cm}}$ 3) $(5x^2y^3)^4 = \underline{\hspace{1cm}}$

REMEMBER:

Rule: Anything to the 0 power always equals 1

$$\text{Ex. } 15^0 = \underline{1}$$
$$257^0 = \underline{1}$$

Negative numbers as exponents have a special meaning. The rule is as follows:

Base ^{negative exponent} = $\frac{1}{\text{base}^{\text{positive exponent}}}$ **Example:** $x^{-3} = \frac{1}{x^3}$

To Multiply Monomials

1. Multiply the numerical coefficients.
2. When variable factors are powers with the same base, multiply by adding exponents.
3. Multiply (combine) the products obtained in steps 2 and 3.

Examples:

1) $(8xy)(3z) = \underline{\hspace{2cm}}$ 2) $(-4a^3)(-5a^5) = \underline{\hspace{2cm}}$ 3) $(-6y^3)(y) = \underline{\hspace{2cm}}$ 4) $(3a^2b^3)(4a^3b^4) = \underline{\hspace{2cm}}$

5) $(6c^2d^3)(-\frac{1}{2}d) = \underline{\hspace{2cm}}$

Multiplying a Polynomial by a Monomial

To multiply a polynomial by a monomial, use the distributive property: multiply each term of the polynomial by the monomial and write the result as the sum of these products.

Examples:

1) $3(6c + 3d) = \underline{\hspace{2cm}}$

2) $4x(5x + 6) = \underline{\hspace{2cm}}$

3) $3xy(x^2 + xy + y^2) = \underline{\hspace{2cm}}$

4) $5r^2s^2(-2r^2 + 3rs - 4s^2) = \underline{\hspace{2cm}}$

More Practice: Find the following products:

1) $(4x^2y^3)(2xy^5)$

2) $(5r^2s)(2rs^2)$

3) $(-3pt^3)(-6p^2t^2)$

4) $(3yt)(2y^3t)$

5) $(5ab^2c)(4a^3b^3c)$

6) $(-2x^4y^3)(-xy^2)$

7) $(7p^3r^2t)(3pr^4t^2)$

8) $(-4r^3x^2)(3r^4x)$

9) $3x(2x + 9)$

10) $5ab(4a^2b + 2ab - 4a)$

11) $5x(3x - 2) - x(1-3x)$

12) $x(x + 5) - 2(x + 5)$

13) $x(x + y) - y(x + y)$

14) $2xy^3(3x^2 + 4xy - y^2)$