

Do Now:

Simplify the following expressions:

$$1.3x^2 - 4x^3 + 2x^2 + 5x^3$$

$$2.2^4 + 4x^2 - 3^2 - 4x^2$$

$$3.2^0 + (4x^3)^2 - 4x^5 - \frac{4x^2}{x}$$

I. Exponents:

- A. $Base^{exponent}$
- B. Any number raised to the zero power = 1
 - 1. $x^0 = 1$
- C. Any number raised to the first power is that number
 - 1. $x^1 = x$

II. Adding and Subtracting Exponents

- A. Must have the SAME terms and the SAME exponents
- B. Add/Subtract the coefficients and leave the variable terms
 - 1. $y^2 + 2y^2$
 - a) $= 3y^2$
 - 2. $x^2y^2 + 2x^2y^2$
 - a) $= 3x^2y^2$
 - 3. $x^2y^2 + 2xy^2$
 - a) $= x^2y^2 + 2xy^2$
 - 4. $x^2y^2z^3 + 2x^2y^2z^2$
 - a) $= x^2y^2z^3 + 2x^2y^2z^2$

III. Multiplying

- A. DOES NOT have to be SAME terms nor the SAME exponents
- B. Multiply the coefficients and ADD the exponents
 - 1. $(y^2)(2y^2)$
 - a) $= 2y^4$
 - 2. $(x^2y^2)(2x^2y^2)$
 - a) $= 2x^4y^4$
 - 3. $(x^2y^2)(2xy^2)$
 - a) $= 2x^3y^4$
 - 4. $(x^2y^2z^3)(2x^2y^2z^2)$
 - a) $= 2x^4y^4z^5$

IV. Dividing

- A. DOES NOT have to be SAME terms nor the SAME exponents
- B. Divide the coefficients and SUBTRACT the exponents
 - 1. $\frac{(y^2)}{(2y^2)}$
 - a) $= \frac{1}{2}$
 - 2. $\frac{(x^2y^2)}{(2x^2y^2)}$

$$a) \quad = \frac{1}{2}$$

$$3. \quad \frac{(x^2y^2)}{(2xy^2)}$$

$$a) \quad = \frac{1x}{2}$$

$$4. \quad \frac{(x^2y^2z^3)}{(2x^2y^2z^2)}$$

$$a) \quad = \frac{1z}{2}$$

V. Powers to Powers

- A. DOES NOT have to be SAME terms nor the SAME exponents
- B. Apply the exponent to each term and MULTIPLY the exponents

$$1. \quad (2x^3)^2$$

$$a) \quad = 4x^6$$

$$2. \quad (3x^3y^2)^2$$

$$a) \quad = 9x^6y^4$$

$$3. \quad (4x^3y^2z^4)^2$$

$$a) \quad = 16x^6y^4z^8$$

VI. Roots of Powers

- A. DOES NOT have to be SAME terms nor the SAME exponents
- B. Apply the root to each term and DIVIDE the exponents (The remainder stays under the radical)

$$1. \quad \sqrt[2]{4x^2}$$

$$a) \quad = \pm 2x$$

$$2. \quad \sqrt[3]{8x^4y^2}$$

$$a) \quad = 2x\sqrt[3]{xy^2}$$

$$3. \quad \sqrt[4]{32x^9y^{10}z^{12}}$$

$$a) \quad = 2x^2y^2z^3\sqrt[4]{2xy^2}$$

VII. Negative Exponents

- A. Changes the position of the term

$$1. \quad 2x^{-2}$$

$$a) \quad = \frac{2}{x^2}$$

$$2. \quad 4x^{-3}y^2$$

$$a) \quad = \frac{4y^2}{x^3}$$

$$3. \quad 3x^{-2}y^3z^{-4}$$

$$a) \quad = \frac{3y^3}{x^2z^4}$$