Algebra II Notes - Monomials

I. VOCABULARY

(a) monomial - a number, a variable, or the product of one or more numbers & variables

(b) constant - a Number (a monomial that contains no variables)

(c) coefficient - the number that sits in front of a variable

(d) degree of a monomial - the sum of its exponents (of its variables - (degree of a constant is 0)

(e) like terms - have same base and same exponent

$2x, 3x, x, -6x$ $3x^2$ ← Not a like term (exponent is different)

Examples:

(ex 1) Which of the following **are** monomials?

X A. x^2+2 (polynomial) X B. $\frac{xy}{z}$ (division by variable ⇒ NOT monomial) ✓ C. x^5

✓ D. $3x^2y^3z$ ✓ E. $\frac{x}{2}$ ($\frac{1}{2}x$) ✓ F. $\sqrt{3}\,y$

(ex 2) Which monomials are **constants**?

X A. x^2 X B. $2x$ ✓ C. 0

✓ D. -5 ✓ E. $\sqrt[3]{6}$ X F. $\sqrt{y}$

(ex 3) What is the **coefficient** of each monomial?

3 A. $3x^4$ −4 B. $-4x^2y$ 5 C. 5 $= 5 \cdot x^0$

1 D. $1x$ $\frac{2}{3}$ E. $\frac{2x}{3}$ $-\frac{1}{2}$ F. $\frac{y}{-2} = \frac{1}{-2} \cdot y$

(ex 4) What is the **degree** of each monomial? Note: the degree of a constant is zero

3 A. x^3 5 B. x^2y^3 3 C. $-3xyz$

8 D. x^4yz^3 12 E. $\frac{1}{2}abc^{10}$ 10 F. $5^5x^5y^5$

(ex 5) Combine like terms: $3x^2 - 2x - 5 + 4x^2 + x - 10 = 7x^2 - x - 15$

Match up Like Terms and add/subtract the Coefficients. (do NOT change exponent)

→ assuming you have same base

II. RULES OF EXPONENTS

Some simple examples can help you figure out the rules

$x^2 \cdot x^3 = (x \cdot x)(x \cdot x \cdot x) = x^5$

mult → + exp.

$a^m \cdot a^n = a^{m+n}$

power to a power - mult. exp.

$(a^m)^n = a^{mn}$ $\quad (x^2)^3 = x^2 \cdot x^2 \cdot x^2 = x^6$

dividing → subtract exp.

$\frac{a^m}{a^n} = a^{m-n}$ $\quad \frac{x^5}{x^2} = \frac{x \cdot x \cdot x \cdot x \cdot x}{x \cdot x} = x^3$

$(ab)^n = a^n b^n$

$a^0 = 1$

$a^{-1} = \frac{1}{a^1} = \frac{1}{a}$

$a^{-n} = \frac{1}{a^n}$

$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$

Examples:

(ex 6) $3x^2y + 4xy^2 - 4x^2y + 6xy^2 = -x^2y + 10xy^2$

(ex 7) $12x^5 - 2x^5 + 11x^5 - x^5 = 20x^5$

(ex 8) $5a^2b^3 - 2a^2b^3 + 3a^3b^2 = 3a^2b^3 + 3a^3b^2$

(ex 9) $\left(\frac{2}{3}a^2b^3c^1\right)\left(-\frac{9}{8}a^5b^4c^3\right) = -\frac{3}{4}a^7b^7c^4$

(ex 10) $(-2x^2)^4 = (-2)^4(x^2)^4 = 16x^8$

(ex11) $(-3xy^2)^3 = (-3)^3x^3(y^2)^3 = -27x^3y^6$

(ex12) $2^{25} \cdot 2^{10} = 2^{35}$

(ex13) $3^{-4} = \frac{1}{3^4} = \frac{1}{81}$

(ex14) $(3^0x^{-5}y^6)^{-2}$ $(3^0)^{-2}(x^{-5})^{-2}(y^6)^{-2} = x^{10}y^{-12} = \frac{x^{10}}{y^{12}}$

(ex15) $(-2ab^2)^4 = (-2)^4a^4(b^2)^4 = 16a^4b^8$

Please review all rules of exponents. Study a little each night!