Name: Notes Date: 4/17/14 GPA 14-1, 14-2, 14-3

14-1, 14-2, 14-3 Polynomials; Adding and Subtracting Polynomials

Polynomial – an algebraic expression that contains one or more monomial using addition or subtraction between terms.

monomial – One term Ex: $5x, 9, y$

trinomial – Three terms Ex: $3x + 2y - 8$

binomial – Two terms Ex: $5x + 2$

polynomial – Four or more terms Ex: $4x^2 + x + y + 7$

Monomial – a number, a variable, or a product of numbers and variables, and any exponents must be whole numbers (no variables, negative values or fractions or decimals within the exponent). ★

Standard form (of a polynomial) is the polynomial written with the highest exponent first followed by the powers of the variable in decreasing order from left to right.

Degree (of a polynomial) – is the greatest exponent on a variable within the polynomials or the sum of the exponents on the variables in a monomial.

linear – Degree of one

quadratic – Degree of two

cubic – Degree of three

Like terms – terms (separated by an addition or subtraction sign) with the same variable(s) raised to the same power(s). ★

Ex. 1: Determine if the term is a monomial or not. Write each term in the appropriate column. If the term is not a monomial, explain.

$\frac{5}{8}x$ 5 $7x^2y^4$ $\frac{10}{m^2}$ x $x^{3.2}$ 3x $x^{\frac{2}{5}}$ $9a^{-4}b^5c^7$

Monomial	Not a Monomial	Explanation
$\frac{5}{8}x$	$\frac{10}{m^2} = 10m^{-2}$	Cannot divide by a variable with a positive exponent
5	$x^{3.2}$	exponent cannot be a decimal
$7x^2y^4$	$x^{\frac{2}{5}}$	exponent cannot be a fraction
x	$9a^{-4}b^5c^7$	exponent cannot be negative
3x		

Ex. 2: Classify the polynomial based on its number of terms. Give the degree of each polynomial.

A. xy^2 x^1y^2 $1+2=3$ monomial; degree: 3

B. $5x - 2x^2 + 6$ trinomial, degree: 2

C. $6x^0$ $= 6 \cdot 1 = 6$ monomial; degree: 0
$x^0 = 1$

D. $-3x^4 + 8x^5 - 4x^6$ trinomial; degree: 6

E. $x + 4$ $x^1 + 4$ binomial; degree: 1

F. $7x^2y^3$ $2+3=5$ monomial; degree: 5

Note: degree → greatest exponent in polynomials or sum of exponents in monomials!

Ex. 3: Write the polynomial in standard form. Then, name the polynomial based on its degree and number of terms.

A. $5x^2 - 2x + 6x^3 + 1$ $6x^3 + 5x^2 - 2x + 1$ Cubic polynomial

B. $10y + 2y^2$ $2y^2 + 10y$ Quadratic binomial

C. $a + 0$ a Linear monomial

D. $8m^3 - 3x^5 + 7x^9 + 4x^2$ $7x^9 - 3x^5 + 8m^3 + 4x^2$ 9th degree polynomial

Ex. 4: Find the sum or difference of the polynomial. ★ Add coefficients to combine like terms!

A. $(5x^3 + x^2 + 2) + (4x^3 + 6x^2 + 3)$

★ underline like terms in order of standard form

$5x^3 + 4x^3 + x^2 + 6x^2 + 2 + 3$

$\boxed{9x^3 + 7x^2 + 5}$

B. $(3mn^2 + 6n - 6m) + (5mn^2 + 2m - n)$

★ Same exponent with different variable, put in alphabetical order

$\boxed{8mn^2 - 4m + 5n}$

C. $(3a^2b^2 + 2a^2 - 5ab) + (-3a^2b^2 + a^2 - 2) + (1 + 6ab)$

$\underbrace{3a^2b^2 - 3a^2b^2}_{\text{zero pair}} + 2a^2 + a^2 - 5ab + 6ab - 2 + 1$

$\boxed{3a^2 + ab - 1}$

D. $(5x^3 + 2x^2 - 3) - (3x^3 + 8x^2 - 4)$

★ Use distributive property

$(5x^3 + 2x^2 - 3) - 1(3x^3 + 8x^2 - 4)$

$5x^3 + 2x^2 - 3 - 3x^3 - 8x^2 + 4$

$\boxed{2x^3 - 6x^2 + 1}$

E. $(3m^2n - 5mn^2 - 8m^2) - (2mn^2 - n^2 + 4m^2n)$

$(3m^2n - 5mn^2 - 8m^2) - 1(2mn^2 - n^2 + 4m^2n)$

$3m^2n - 5mn^2 - 8m^2 - 2mn^2 + n^2 - 4m^2n$

$\boxed{-m^2n - 7mn^2 - 8m^2 + n^2}$

★ double variable terms first → alphabetically and by greatest exponent

F. $(b^2 + 4b - 1) - (1 - b + 7b^2)$

$(b^2 + 4b - 1) - (1 - b + 7b^2)$

$b^2 + 4b - 1 - 1 + b - 7b^2$

$\boxed{-6b^2 + 5b - 2}$

Note:

1. Signs in front of each term indicate positive or negative (rather than plus or minus).
2. When there is a subtraction (minus) sign in front of a set of parentheses, you MUST distribute the negative to EVERY term inside the parentheses (same as distributive property).
3. Order variables alphabetically & by exponents – double variables first, highest exponents first!!!

HW: 14-1, 14-2, 14-3 Worksheet