PRINICIPLES - LESSON 11A
CLASSIFYING, ADDING, & SUBTRACTING POLYNOMIALS

Definitions

"mono" = one / only / single

monomial = an algebraic expression that has only one term

"poly" = many / much

polynomial = an algebraic expression that has one OR MORE terms

CLASSIFYING POLYNOMIALS BY NUMBER OF TERMS

# of terms	Polynomial	Name by # of terms
1	$4xy$	monomial
2	$4xy + 3$	binomial
3	$x^2 + 3x - 4$	trinomial
4	$r + x^2 + 3x - 4$	polynomial of 4 terms
5	$5z^2 + 3n - 2x + 11y + 6$	polynomial of 5 terms
6	$a + b - c + d - e + f$	polynomial of 6 terms

Remember: terms are separated by "+" or "-" signs.

CLASSIFYING POLYNOMIALS BY NUMBER OF TERMS

Classify each polynomial by the number of terms it contains.

ex1) $3x^4 - 27$ 2 terms $\longrightarrow$ binomial

ex2) abcd   1 term $\longrightarrow$ monomial

ex3) $8k^5 - 2k^4 + 3k^2 + 2k^3 - k$ 5 terms $\longrightarrow$ polynomial of 5 terms

ex4) $2x^2 - 5x + 2$ 3 terms $\longrightarrow$ trinomial

DEGREE OF A POLYNOMIAL

The **degree** of a polynomial with a single variable is equal to the highest exponent on a variable within the polynomial.

State the degree of each polynomial.

ex5) $2y^3 + 4y$

degree 3

ex6) $4r^2 + 4r^3 - 3r + 5r^4$

degree 4

ex7) $2g^3 - 9g^7 + 8$

degree 7

ex8) $n + 2$

degree 1

CLASSIFYING POLYNOMIALS BY DEGREE

Degree	Polynomial	Name by degree
0	7	constant
1	$3x + 4$	linear
2	$x^2 + 3x - 4$	quadratic
3	$y^3 - 1$	cubic
4	$3j^4 - 2j^3 - 5$	quartic
5	z^5	quintic

CLASSIFYING POLYNOMIALS

Classify each polynomial by both degree and the number of terms it contains.

ex9) $n - 7$ degree 1

2 terms

linear binomial

ex10) 5 degree 0

1 term

constant monomial

ex11) $8k^5 - 2k^4 + 3k^2$ degree 5

3 terms

quintic trinomial

STANDARD FORM OF A POLYNOMIAL

To write a polynomial in standard form means to write each term from left to right from the greatest exponent to the least.

Standard form is sometimes called descending order.

Write each polynomial in standard form.

ex12) $3a^2 + 2 - 2a^5$

$$= \boxed{-2a^5 + 3a^2 + 2}$$

ex13) $4r^2 + 4r^3 - 3r + 5r^4$

$$= \boxed{5r^4 + 4r^3 + 4r^2 - 3r}$$

COMBINING LIKE TERMS

Recall: Like Terms

like terms: terms that have exactly the same variables & exponents

to combine: to add

LIKE TERMS	UNLIKE TERMS
$5a$ & a	$4a$ & $4b$
$3m^2$ & $-6m^2$	$2m^2$ & $3m$
$-7x^2y^3$ & $-2x^2y^3$	$7x^2y^3$ & $2x^3y^2$

COMBINING LIKE TERMS

Remember: We can only combine LIKE terms.

> **Combine like terms by combining their coefficients.**
> **Do NOT change exponents when combining.**

Simplify. Write all answers in standard form.

ex14) $3k + 4z + 9k - 10z$

$= \boxed{12k - 6z}$

ex15) $-6ab^4 + 4ab^3 + 2ab^4$

$= \boxed{-4ab^4 + 4ab^3}$

COMBINING LIKE TERMS

Simplify. Write all answers in standard form.

ex16) $4j^4 + 3j^3 - 2j^2 - j + 6$

This was already simplified and written in standard form

$$= \boxed{4j^4 + 3j^3 - 2j^2 - j + 6}$$

ex17) $10x^2 - 2x^3 + 4x - 6x^2 + 8x - 4x^3$

$$= \boxed{-6x^3 + 4x^2 + 12x}$$

ADDING & SUBTRACTING POLYNOMIALS

Add the quadratic trinomial to the linear binomial.

ex18) $(k^2 + 4k - 3) + (6k - 1)$

$= k^2 + 4k - 3 + 6k - 1$

$= \boxed{k^2 + 10k - 4}$

Subtract the linear binomial from the quadratic trinomial.

ex19) $(k^2 + 4k - 3) - (6k - 1)$

$= k^2 + 4k - 3 - 6k + 1$

$= \boxed{k^2 - 2k - 2}$

ADDING & SUBTRACTING POLYNOMIALS

To add or subtract polynomials:

1. Distribute to clear all grouping symbols.

2. Combine like terms where possible.

3. Write the polynomial in standard form.

ADDING & SUBTRACTING POLYNOMIALS

Simplify. Write answers in standard form.

ex20) $(9y^2 - 2y^3 - 4y - 5) - (y - 3y^2 + 3y + 5)$

$= 9y^2 - 2y^3 - 4y - 5 - y + 3y^2 - 3y - 5$

$= \boxed{-2y^3 + 12y^2 - 8y - 10}$

ex21) $(4r^5 - 7r^4 + 2r^3) + (3r^3 + 1 - 4r^5 - 9r)$

$= 4r^5 - 7r^4 + 2r^3 + 3r^3 + 1 - 4r^5 - 9r$

$= \boxed{-7r^4 + 5r^3 - 9r + 1}$