

Bellwork: Course Disclosure

Today's Objective:

1. I can add, subtract, & multiply polynomial expressions.

Terms: any numbers and/or variable(s) multiplied together. Terms are separated by plus and minus signs. There are four terms in this example. Can you circle them?

$$23x^3y - xy + 58y - 4$$

Variable: the "letter" part of a term. Some terms have many variables, while others have none.

Coefficient: the number part of a term. If no number is written, assume 1. The sign in front of the term is the sign of the coefficient. Name the example's coefficients.

Degree of a Term: the total of all the exponents of the variables in a term. If no exponent is written, assume 1. If a term has no variables, it is called a constant term and has a degree of zero. Identify the degree of each term in the example.

Degree of a Polynomial: the highest degree of any term, given that the polynomial is in simplified form. What is the degree of the example?

Like Terms: terms that have identical variable parts. Like terms can be combined by adding coefficients. The variable part remains the same when combining.

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$$\begin{array}{r} \underline{3x^2} + \underline{7x} + \underline{5x^2} - \underline{x} + \underline{9} \\ 8x^2 + 6x + 9 \end{array}$$

Simplified Form: a polynomial written as the sum of terms where no terms are like and the degrees of the terms are in descending order. If degrees are the same, then order those alphabetically by variable. You should also know that the exponents of variables must be non-negative integers in order to be classified as a polynomial.

Adding Polynomials: Combine Like Terms

$$(3x^2 + 7x) + (5x^2 - x + 9)$$

Horizontal Method

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

$$8x^2 + 6x + 9$$

Vertical Method

$$3x^2 + 7x$$

$$5x^2 - x + 9$$

$$\hline 8x^2 + 6x + 9$$

Subtracting Polynomials: "Distribute" the negative and combine like terms

$$(3x^2 + 7x) - (5x^2 - x + 9)$$

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

$$-2x^2 + 8x - 9$$

Multiplying Polynomials: Distribute all terms

*Multiply coefficients, add exponents of variables

$$2x^3 (5x^2 - x^1 + 9)$$

$$10x^5 - 2x^4 + 18x^3$$

Two methods of multiplication with two polynomials:

$$(3x^2 + 7x)(5x^2 - x + 9)$$

"FOIL" method

$$(3x^2 + 7x)(5x^2 - x + 9)$$

$$15x^4 - 3x^3 + 27x^2$$

$$35x^3 - 7x^2 + 63x$$

$$15x^4 + 32x^3 + 20x^2 + 63x$$

"Box" method

$$3x^2 \quad +7x$$

$5x^2$	$15x^4$	$35x^3$
$-x$	$-3x^3$	$-7x^2$
$+9$	$27x^2$	$63x$

Combine all three!

$$\begin{aligned} & 3x(7x^2 - 4x + 9) - (2x + 5) + x(x^3 - x) \\ & 21x^3 - \underline{12x^2} + 27x - 2x - 5 + x^4 - x^2 \\ & x^4 + 21x^3 - 13x^2 + 25x - 5 \end{aligned}$$