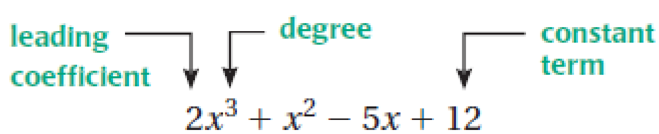
Algebra 1 Notes SOL A.2 (9.1 9.2) Adding, Subtracting, Multiplying Polynomials Mrs. Grieser

Name: ________________________________ Block: _______ Date: _____________

Adding and Subtracting Polynomials

Monomial	Number, variable, or product of a number and one or more variables with whole number exponents.
Degree of a monomial	Sum of the exponents of the variables in the monomial.
Polynomial	A monomial or the sum of monomials (each monomial is a term of the polynomial).
Degree of a polynomial	The greatest degree of its terms.
Leading coefficient	Coefficient of the first term (the term with greatest degree) in a polynomial.
Binomial	A polynomial with two terms.
Trinomial	A polynomial with three terms.

Example of a polynomial:



We write polynomials <u>in descending order of the degree of the terms</u> (standard form):

<u>Example</u>: Rewrite $15x - x^3 + 3$ so that exponents are in decreasing order. Identify the degree and leading coefficient.

Answer: Polynomial _______________ Degree _________ Leading Coefficient _______

<u>Example</u>: Identify whether the following expressions are polynomials. If it is, what is the degree and how many terms are there? If it is not, why not?

Expression	Polynomial?	Degree, num terms OR why not?
a) 9		
b) $2x^2 + x - 5$		
c) $6n^4 - 8^n + \sqrt{n}$		
d) $n^{-2} - 3$		
e) $7b^5c^3 + 4b^4c$		

- <u>Add</u> polynomials by combining like terms
- <u>Subtract</u> polynomials by first multiplying second polynomial by -1 and then add

a) $(2x^3 - 5x^2 + x) + (2x^2 + x^3 - 1)$	b) $(3x^2 + x - 6) + (x^2 + 4x + 10)$
c) $(4x^2 + 5) - (-2x^2 + 2x - 4)$	d) $(4x^2 - 3x + 5) - (3x^2 - x - 8)$

Multiplying Polynomials

Multiplying a monomial and a polynomial

Example: $2x^3(x^3 + 3x^2 - 2x + 5)$

Use the distributive property, and then combine like terms:

$2x^3(x^3 + 3x^2 - 2x + 5) = 2x^6 + 6x^5 - 4x^4 + 10x^3$

Multiplying a polynomial and a polynomial (more than one term in each polynomial)

Example: $(x - 4)(3x + 2)$

<table>
<tr>
<td>Method 1: Table
$\begin{array}{c|c|c} & 3x & 2 \\ \hline x & 3x^2 & 2x \\ \hline -4 & -12x & -8 \end{array}$
• Multiply each entry by row and column
• Add terms in boxes:
$3x^2 + 2x - 12x - 8 =$
$3x^2 - 10x - 8$</td>
<td>Method 2: Vertically
$\begin{array}{rr} & (x - 4) \\ \times & (3x + 2) \\ \hline & 2x - 8 \\ & 3x^2 - 12x \\ \hline & 3x^2 - 10x - 8 \end{array}$
• Uses same method as multiplying two digit numbers
• Align like terms</td>
<td>Method 3: Horizontally
$(x - 4)(3x + 2) =$
$3x^2 + 2x - 12x - 8 =$
$3x^2 - 10x - 8$
• Distribute each term in the first polynomial over each term in the second polynomial
• Combine like terms</td>
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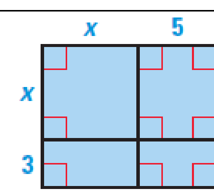
The FOIL Method

The FOIL method is a way to remember the horizontal method described above (multiple distribution). It works when a binomial is multiplied by another binomial.

FOIL = **F**irst **O**uter **I**nner **L**ast

$$(2x + 3)(4x + 1) = \overset{\text{First}}{8x^2} + \overset{\text{Outer}}{2x} + \overset{\text{Inner}}{12x} + \overset{\text{Last}}{3}$$

You try:

<table>
<tr><td>a) $x(2x^2 - 3x + 9)$</td><td>b) $-a^5(-9a^2 + 5a + 24)$</td><td>c) $(x + 2)(x - 3)$</td></tr>
<tr><td>d) $(y - 5)(2y + 3)$</td><td>e) $(s + 4)(s^2 + 6s - 5)$</td><td>f) $(2r - 1)(5r + 3)$</td></tr>
<tr><td colspan="3">g) Write a polynomial that represents the area of the shaded region:

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