I. What is a term? _CAN be A number, letter, or product of both_
X, 8, 8x   terms are separated by plus or minus

Monomial: _one term $8x$, $9y^2$, $-10xyz^2$_

Binomial: _two terms $A + b$, $8x^2 - 9y^2$_

Trinomial: _three terms $x^2 + 6x - 16$_

Polynomial: _mAny terms, general nAme_

II. Adding and Subtracting Polynomials: must have _Like_ _terms_.

Like terms must have the same _vAriAble (letter)_ and the same _exponent (power)_

Add or subtract only the coefficients: _number in front of letter, 8x_

All Polynomials must be in descending order, _highest exponent to lowest exp_

Hint: might want to stack the like terms then add

EXAMPLE: $(5x^2 - 3x + 1) + (2x^2 + 7x - 3)$

$$5x^2 - 3x + 1$$
$$2x^2 + 7x - 3$$
$$\overline{7x^2 + 4x - 2}$$

EXAMPLE: $(3y^2 + 7y - 3) + (4y^2 + 1)$

$$3y^2 + 7y - 3$$
$$4y^2 \qquad + 1$$
$$\overline{7y^2 + 7y - 2}$$

EXAMPLE: $(7x + 4) - (2x + 1)$

$$7x + 4$$
$$\underline{-2x - 1}$$
$$5x + 3$$

EXAMPLE: $(8y^2 + y - 11) - (3 + 6y^3 - 8y^2)$

$$8y^2 + y - 11$$
$$\underline{+8y^2 \quad\quad -3 - 6y^3}$$
$$16y^2 + y - 14 - 6y^3$$

$$= -6y^3 + 16y^2 + y - 14$$

EXAMPLE: $5(2x^2 - 3x + 7) - 2(6x^2 - x + 12)$

multiply First!
distribute!

$$10x^2 - 15x + 35$$
$$\underline{-12x^2 + 2x - 24}$$
$$-2x^2 - 13x + 11$$

III. Multiplying Polynomials: use <u>*distributive property and FOIL*</u>
Use the exponent rule, *Product Rule*: when you multiply like bases, you add exponents.

Multiply and distribute (multiply all terms inside parentheses):

EXAMPLE: $5x^2 (2x^2 - 5x - 1)$ $10x^4 - 25x^3 - 5x^2$

EXAMPLE: $-3x^2 (7x^3 - 4x^2 + 4x)$ $-21x^5 + 12x^4 - 12x^3$

Multiply and FOIL:
FOIL is the same as distributive property only you distribute more than one time before combining like terms. FOIL is used for multiplying binomials.

F   First

O   Outer/Outside

I   Inner/Inside

L   Last

EXAMPLE: $(2x + 4) (3x - 5)$

$(2x + 4)(3x - 5) = 6x^2 - 10x + 12x - 20$

$6x^2 + 2x - 20$

3

EXAMPLE: $(6m + 1)(4m - 3)$

$$24m^2 - 18m + 4m - 3$$
$$24m^2 - 14m - 3$$

EXAMPLE: $(3p + 11)(3p - 11)$ special case called _conjugates_
middle terms cancel

$$9p^2 - 33p + 33p - 121$$
$$9p^2 - 121$$

EXAMPLE: $(9y - 2)(9y + 2)$

$$81y^2 - 4$$

Squaring a binomial. Squaring means two. Write it two times and FOIL

EXAMPLE: $(x + 7)^2$ the trinomial is called a _perfect square trinomial_

$$(x+7)(x+7) = x^2 + 7x + 7x + 49$$
$$x^2 + 14x + 49$$

EXAMPLE: $(6a - 5)^2$

$$(6a - 5)(6a - 5) = 36a^2 - 30a - 30a + 25$$
$$36a^2 - 60a + 25$$

IV. The opposite of multiplying is ___dividing___

The opposite of multiplying polynomials is ___factoring polynomials___

Use the exponent rule, *Quotient Rule*: when you divide like bases, you subtract exponents.

Factoring the **Greatest Common Factor** (GCF) is the opposite of the distributive property:

Find the largest number that divides all coefficients,
Subtract the smallest exponent from all variables

EXAMPLE: $18a^6 - 12a^4$

$$6A^4\left(3A^2 - 2\right)$$

EXAMPLE: $8x - 24$

$$8\left(1x - 3\right)$$

EXAMPLE: $6x^2y + 8xy + 12y$

$$2y\left(3x^2 + 4x + 6\right)$$

Factoring **Trinomials**, $1x^2 + bx + c$, is the opposite of FOIL: ___look at the last term.___

Find two numbers you multiply to get last number
but add or subtract to get the middle number

EXAMPLE: $x^2 + 8x + 12$ ADD

$$(x + 2)(x + 6)$$

$$\frac{12}{1 \cdot 12}$$
$$2 \cdot 6$$
$$3 \cdot 4$$

EXAMPLE: $x^2 - 5x + 6$ ADD

$$(x - 2)(x - 3)$$

Add–same signs

subtract–opposite signs

EXAMPLE: $x^2 + 2x - 35$ subtract

$$(x + 7)(x - 5)$$

$\dfrac{35}{1 \cdot 35}$
$5 \cdot 7$

EXAMPLE: $x^2 - 14x + 49$ perfect square trinomial

$$(x - 7)(x - 7) \longrightarrow (x - 7)^2$$

EXAMPLE: $36a^2 + 60a + 25$

$$(6A + 5)(6A + 5) \longrightarrow (6A + 5)^2$$

EXAMPLE: $x^2 - 36$ conjugates

difference of squares

$$(x - 6)(x + 6)$$

EXAMPLE: $4x^2 - 49$

$$(2x - 7)(2x + 7)$$