FACTORING BINOMINALS

Greater Common Factor (GCF)

For example, consider the binomial $8x^2 + 12x$. Think of the factors of each

term = 4*2*x*x + 4*3*x

A. Look for a number and/or variable that are common to both terms

1. Greatest common number is 4 (although "2" is also common to both terms,

it is not the **greatest.)**

2. The common variable for both terms is "x" with the smallest exponent,

in this case is x^1.

3. Finally, combining the common numbers with common variables, we get

the GCF = 4x.

B. Divide each term by GCF.

$$\frac{8x^2}{4x} + \frac{12x}{4x} = 2x + 3$$

C. Rewrite the expression with GCF outside parentheses and the remainder after division inside. Note: the gcf is part of the factored form – don't drop it off.

4x(2x+3)

D. Examples: $2x^3+3x^2-12x = 3x(x^2+4x-4)$

$9yx^3+3yx-6y^2x = 3yx(3x^2+1-2yx)$

FACTORING BINOMIALS – SPECIAL CASES

A. Difference of Squares $\boxed{A^2 - B^2 = (A-B)(A+B)}$

First, **identify** that you have the **difference** of perfect squares!!!

EXAMPLES OF PERFECT SQUARES

NUMBERS	VARIABLES	COMBINATIONS
1	$a^2\ b^2\ x^2\ y^2$	$25x^2$
4	$a^4\ b^4\ x^4\ y^4$	$64b^4$
9	$a^6\ b^6\ x^6\ y^6$	$9a^6$
16	$a^8\ b^8\ x^8\ y^8$	$81y^8$
25	$a^{10}\ b^{10} x^{10} y^{10}$	$16x^{10}$

EXAMPLES OF BINOMIALS

1) $4x^2 \underset{\text{Difference}}{-} 9y^6$ OK

2) $x^2 \underset{\text{Difference}}{-} 27$ NOT OK

3) $\overbrace{49x^2}^{\text{perfectSquare}} \underset{\text{NOTaDifference}}{+} \overbrace{81y^6}^{\text{PerfectSquare}}$ NOT OK

4) $\overbrace{25x^4}^{\text{PerfectSquare}} \underset{\text{Difference}}{-} \overbrace{81}^{\text{PerfectSquare}}$ OK

Example: $x^2 - 4$

1. Identify the powers of each term of both terms in this problem. x^2 and 2^2
2. Make sure that the expression is a difference (means minus (–) between the terms).
3. Take the $\sqrt{\ }$ of the first term and use that as the first term in each factor $\sqrt{x^2} = \mathbf{X}$.
4. Take the $\sqrt{\ }$ of the second term and use that as the second term in each factor $\sqrt{4} = \mathbf{2}$.
5. Make the signs in each factor opposite $(\ +\ )(\ -\ )$.
6. Use the results of the square roots is the factoring process:

Ex: $4x^2 - 9y^6 = (2x - 3y^3)(2x + 3y^3)$

$\mathbf{x^2 - 81 = (x+9)(x-9)}$