## **FACTORING BINOMINALS**

Greater Common Factor (GCF)

For example, consider the binomial  $8x^2 + 12x = \text{think of the factors of each}$  $term = \underbrace{4*2*x*x}_{} + \underbrace{4*3*x}_{}$ 

- 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 <u>smallest</u> 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.

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

- 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:  $2x^3+36x^2-12x=2x(x^2+18x-6)$

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

### FACTORING BINOMIALS - SPECIAL CASES

A. Difference of Squares

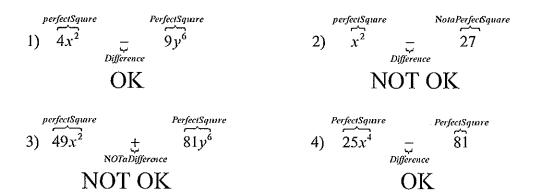
 $A^2 - B^2 = (A - B)(A + B)$ 

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

### **EXAMPLES OF PERFECT SQUARES**

| <u>NUMBERS</u> | <u>VARIABLES</u>  | <b>COMBINATIONS</b> |
|----------------|---|---------------------|
| 1              | $a^2 b^2 x^2 y^2$   | $25x^2$             |
| 4              | $a^4 b^4 x^4 y^4$   | 64b <sup>4</sup>    |
| 9              | a <sup>6</sup> b <sup>6</sup> x <sup>6</sup> y <sup>6</sup> | 9a <sup>6</sup>     |
| 16             | $a^8 b^8 x^8 y^8$   | 81y <sup>8</sup>    |
| 25             | $a^{10} b^{10} x^{10} y^{10}$                               | $16x^{10}$          |

#### **EXAMPLES OF BINOMIALS**



Example 1: factor  $X^2 - 4$ .

- 1. Identify the perfect squares of both terms: in this case are  $X^2$  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  $\sqrt{4} = 2$ .
- 5. Make the signs in each factor opposite (+)(-).
- 6. Use the results of the square roots is the factoring process:  $F_{YY} = 4x^2 6x^6 (2x 2x^3)(2x + 2x^3)$

Ex: 
$$4x^2 - 9y^6 = (2x - 3y^3)(2x + 3y^3)$$
  
 $x^2 - 81 = (x+9)(x-9)$