

### General Strategy for Factoring Polynomials Completely

To **factor completely** any given polynomial follow these steps:

**Step 1:** Look for a GCF. If there is a GCF, factor it out.

**Step 2:** Look at the number of terms in the polynomial. This determines how you should factor the poly.

**2 terms in poly:**

- Is it a sum of perfect squares?  $A^2 + B^2$  then poly is Prime
- Is it a difference of perfect squares?  $A^2 - B^2$  then poly factors as  $(A + B)(A - B)$  or  $(A - B)(A + B)$   
*either order for factors is ok*

**3 terms in poly:**

- Is it a perfect-square trinomial? Use the appropriate formula listed below.

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

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

- Is it of the form  $x^2 + bx + c$ ?  
 $x^2 + bx + c = (x \quad )(x \quad )$

Find 2 numbers that *multiply to c* and *add to b*.  
If no such numbers exist, the poly is prime.

- Is it of the form  $ax^2 + bx + c$ ?  
Use Trial and Error OR Factor by grouping.

**4 terms in poly:** Try factor by grouping.

**Step 3:** Look at each factor. Can it be factored further? The poly is factored completely when none of the factors can be factored further.

**Step 4:** Check your factorization by multiplying. The product of all the factors should be the *original* polynomial.