Factoring Trinomials

In order to factor a **trinomial**, we will create a polynomial of **FOUR** terms so we can factor by grouping.

We do this by **re-writing the middle term** as a sum or difference of two terms.

Factoring a trinomial of the form

$$ax^2 + bx + c$$

Step 1: Find the factors of $a \cdot c$ that sum to b.
Step 2: Break up the middle term as a sum (or difference) using the factors found in Step 1.
Step 3: Factor by grouping.

Example 1:

Factor:

$$4x^2 - 5x - 6$$

$a =$ _____
$b =$ _____
$c =$ _____
$a \cdot c =$ -24

We want to find factors of -24 that sum to _____.

To find these factors, we make a list:

-24		SUM
-24	1	-23
-12	2	_____
-6	4	_____
-3	8	_____
3	-8	-5

Now that we have identified the factors, we can rewrite the trinomial by breaking up the middle term.

$$4x^2 - 5x - 6$$

$$4x^2 + 3x - 8x - 6$$

And now that we have four terms, we can factor by grouping.

$$\underbrace{4x^2 + 3x}\ \underbrace{- 8x - 6}$$

Example 2:

Factor each trinomial.

a.) $\mathbf{4x^2 - 2x - 6}$

b.) $\mathbf{10a^2 + 9a + 2}$

c.) $\mathbf{4w^2 + 8w + 3}$

d.) $\mathbf{5x^2 - 16x + 3}$

Factoring Trinomials — Practice Problems

Factor each trinomial:

1. $\mathbf{3x^2 + 10x + 7}$

2. $\mathbf{12a^2 + 11a - 5}$

3. $\mathbf{10w^2 - 11w - 6}$

4. $\mathbf{6x^2 - 17x + 12}$

5. $\mathbf{10c^2 - 23c + 12}$