

Factoring  $Ax^2 \pm Bx \pm C$  by the AC method

Ex. I  $-8x^2 + 38x - 24$

1. Factor out any GCF and if the leading coefficient is negative factor out  $-1$ .

$$-8x^2 + 38x - 24 = -2 ( 4x^2 - 19x + 12 )$$

2. Find A, B, and C all non-negative.

$$A = 4, B = 19, C = 12$$

3. Multiply A by C and find the products pairs of factors.

$$AC = 48$$

48	1
24	2
16	3
12	4
8	6

4. Add or subtract depending on the constant term.

$$-2 ( 4x^2 - 19x + 12 ) , \text{ so add}$$

$$48 + 1 = 49$$

$$24 + 2 = 26$$

$$16 + 3 = 19$$

$$12 + 4 = 16$$

$$8 + 6 = 14$$

5. Look for B in the results of step 3.

$$16 + 3 = 19$$

6. Rewrite the term  $\pm Bx$  as the sum or difference of the pair of factors, from step 5, times  $x$ .

$$-2 ( 4x^2 - 19x + 12 ) = -2 ( 4x^2 - 16x - 3x + 12 )$$

7. Factor this by groups.

$$-2 [ ( 4x^2 - 16x ) - 3x + 12 ]$$

$$-2 [ 4x( x - 4 ) - 3( x - 4 ) ]$$

$$-2 ( x - 4 ) ( 4x - 3 )$$

$$\text{Thus, } -8x^2 + 38x - 24 = -2 ( x - 4 ) ( 4x - 3 )$$

Ex. II  $9x^2 + 34x - 8$

$$A=9, B=34, C=8, AC=72$$

$$9x^2 + 36x - 2x - 8$$

$$72 - 1 = 71$$

$$9x( x + 4 ) - 2( x + 4 )$$

$$36 - 2 = 34$$

$$( x + 4 ) ( 9x - 2 )$$

$$24 - 3 = 21$$

$$18 - 4 = 14$$

$$12 - 6 = 6$$

$$9 - 8 = 1$$

**Notes:** If B doesn't appear in step 4,5 then the trinomial is prime.

Since, A, B, & C are chosen to be non-negative, they are not the coefficients. ( i.e. in Ex I.  $A=4, B=19$  &  $C=12$ , but the coefficients are 4,  $-19$  & 12 )

Steps 3, 4 & 5 can be combined. So that, you only have to find pairs of factors until B appears.

Don't lose the GCF.

If the pairs of factors are written in order as show, the sums/differences will go from largest to smallest.

Ex. III  $48x^2 - 81x - 30$

$$160 - 1 = 159$$

$$3( 16x^2 - 27x - 10 )$$

$$80 - 2 = 78$$

$$3[ ( 16x^2 - 32x ) + 5x - 10 ]$$

$$40 - 4 = 36$$

$$3[ 16x( x - 2 ) + 5( x - 2 ) ]$$

$$32 - 5 = 27$$

$$3( x - 2 ) ( 16x + 5 )$$