Bottoms Up Method of Factoring

Basic Trinomial (ax^2+bx+c) **with** $a \neq 1$

Example A: $3x^2+10x+8$

Step 1: Factor out any common terms

No common terms

Step 2: Multiply "a" and "c"

$3 \cdot 8 = 24$

Step 3: Look for all pairs of factors for this number
(Remember if the number is negative, you will have to look at each set with one number positive and one number negative)

24: (1,24) (2, 12) (3,8) (4,6)

Step 4: Choose pair of numbers whose sum will = "b" term

$4+6=10$

Step 5: Use this pair to write "preliminary" factors

$(x+4)(x+6)$

Step 6: Divide the numbers by the leading coefficient.

$\left(x+\frac{4}{3}\right)\left(x+\frac{6}{3}\right)$

Step 7: If the numbers divide "evenly" (resulting in an integer) then this is the factor. If the numbers do NOT divide evenly, then pull the divisor up to be the leading coefficient of the x term:

$(3x+4)(x+2)$ done!!!

Practice:

1.) $5x^2-17x+6$

2.) $3x^2-x-10$

Trinomial (ax^2+bx+c) with common terms

Example B: $36x^2-33x+6$

Step 1: Factor out any common terms

$3(12x^2-11x+2)$ Hint: To factor, just ignore the common term (here "3")

Step 2: Multiply "a" and "c" of the expression **INSIDE** the parentheses

$12\cdot 2=24$

Step 3: **Look for all pairs of factors for the number** *ac* (here "24")
Remember if *ac* **is negative**, you will have to look at each set with one number positive and one number negative.
Also, if *ac* **is positive**, **but** *b* **is negative**, then you know both factors are negative.

24: (-1,-24) (-2, -12) (-3,-8) (-4,-6)

Step 4: Choose pair of numbers whose sum will = "b" term

$-3-8=-11$

Step 5: Use this pair to write "preliminary" factors

$3(x-3)(x-8)$

Step 6: Divide the numbers by the leading coefficient.

$3\left(x-\frac{3}{12}\right)\left(x-\frac{8}{12}\right)$

Step 7: If one or both fractions **do not divide "evenly"** (resulting in a integer) then **SIMPLIFY** the fractions as shown below, then pull up the divisor to be the leading coefficient of the x term:

$3\left(x-\frac{1}{4}\right)\left(x-\frac{2}{3}\right)$ = $3(4x-1)(3x-2)$ done!!!

Practice:

3.) $4x^2+10x-6$

4.) $40x^2-10x-5$

5.) $30x^2-3x-6$