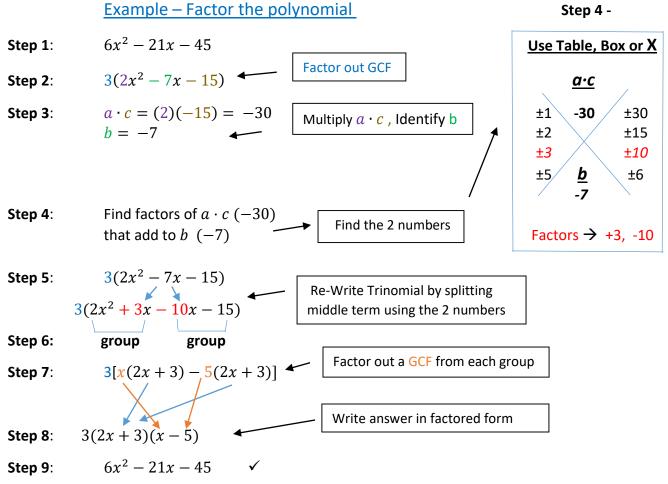# Factoring – Traditional AC Method w/ Grouping

If a Trinomial of the form $ax^2 + bx + c$ is factorable, it can be done using the Traditional AC Method

Step 1. Make sure the trinomial is in standard form ($ax^2 + bx + c$).

Step 2. Factor out a GCF (Greatest Common Factor) if applicable.

Step 3. Multiply "$a \cdot c$" and identify *"b"*.

Step 4. Begin listing factor pairs of "$a \cdot c$". Continue until you find the pair of numbers that **multiply** to equal "$a \cdot c$", but **add up** to equal "b". *(Note: Use a table, box, or an "X" if needed.)*

Step 5. Use the two numbers found in Step 4 to **rewrite** the trinomial as a 4 term polynomial by breaking up the middle term into two parts.

Step 6. Factor the resulting polynomial using the Grouping Method by grouping the first two terms together and grouping the second two terms together.

Step 7. Factor out a GCF from each of the paired factors. If there is not a GCF, factor out a "1".

Step 8. The remaining terms inside the two sets of parenthesis should be identical. This is one factor of the trinomial. The other factor is formed by combining the GCF's into a second set of parenthesis.

Step 9. Check the answer - Multiply the factors to verify that you get the original trinomial.

Example – Factor the polynomial

Step 4 -

Step 1: $6x^2 - 21x - 45$

Step 2: $3(2x^2 - 7x - 15)$ ← Factor out GCF

Step 3: $a \cdot c = (2)(-15) = -30$
$b = -7$ — Multiply $a \cdot c$, Identify b

Use Table, Box or X

$a \cdot c$

	-30	
±1		±30
±2		±15
±3		±10
±5	b	±6
	-7	

Step 4: Find factors of $a \cdot c$ (−30) that add to b (−7) → Find the 2 numbers

Factors → +3, -10

Step 5: $3(2x^2 - 7x - 15)$

$3(2x^2 + 3x - 10x - 15)$ ← Re-Write Trinomial by splitting middle term using the 2 numbers

Step 6: group   group

Step 7: $3[x(2x + 3) - 5(2x + 3)]$ ← Factor out a GCF from each group

Write answer in factored form

Step 8: $3(2x + 3)(x - 5)$

Step 9: $6x^2 - 21x - 45$ ✓

Factoring - Traditional AC Method - Practice Problems

Directions - Factor the following trinomials by using the Traditional AC factoring method.

	Problem	**Answer**
1.	$2x^2 - 9x - 18$	$(x - 6)(2x + 3)$
2.	$8x^2 + 2x - 3$	$(2x - 1)(4x + 3)$
3.	$3x^2 + 19\,x - 40$	$(x + 8)(3x - 5)$
4.	$8x^2 - 12x - 8$	$4(2x + 1)(x - 2)$
5.	$10x^2 - 25x - 125$	$5(2x + 5)(x - 5)$
6.	$6x^2 - x - 2$	$(2x + 1)(3x - 2)$
7.	$3x^2 - 9x - 12$	$3(x + 1)(x - 4)$
8.	$\frac{5}{2}x^2 - \frac{11}{2}x + 1$	$\frac{1}{2}(5x - 1)(x - 2)$
9.	$\frac{1}{4}x^2 - \frac{1}{2}x - 6$	$\frac{1}{4}(x + 4)(x - 6)$
10.	$(7x - 2)(x + 6)$	$(7x - 2)(x + 6)$