

Factoring Trinomials in the form
 $ax^2 + bx + c$

To Factor By Grouping (Also known as A/C method):

STEPS	EXAMPLE: $2x^2 - 7x - 15$
1. Multiply 2 by -15	$2(-15) = -30$
2. Find two factors of 30 that add to -7. Since the 15 is negative the factors should be opposite signs.	$30, 1$ $15, 2$ $(10, 3) \rightarrow -10 + 3 = -7$
3. Rewrite the trinomial with 4 terms using the two factors from step 2.	$2x^2 - 10x + 3x - 15$
4. Find the GCF out of the 1 st two terms Find the GCF out of the 2 nd two terms	$2x(x-5) + 3(x-5)$
5. Factor the binomial GCF out, leaving the expression in factored form.	$(x-5)(2x+3)$
6. Check you answer using the distributive property.	$(x-5)(2x+3)$ $= 2x^2 + 3x - 10x - 15$ $= 2x^2 - 7x - 15 \checkmark$

Examples: Factor.

1. $2x^2 + 7x + 6$

$2(6) = 12$
 $12, 1$
 $(3, 4)$
 $6, 2$

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

$x(2x+3) + 2(2x+3)$

$(2x+3)(x+2)$

2. $2x^2 + x - 6$

$2(-6) = -12$
 $12, 1$
 $(3, 4)$
 $6, 2$

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

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

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

$$3(-5) = -15 \quad \begin{matrix} 15, 1 \\ 3, 5 \end{matrix}$$

$$3. 3x^2 + 2x - 5$$

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

$$(3x+5)(x-1)$$

$$1(15) = 15 \quad \begin{matrix} 15, 1 \\ 3, 5 \end{matrix}$$

$$4. x^2 - 8x + 15$$

$$x^2 - 5x - 3x + 15$$
$$x(x-5) - 3(x-5)$$

$$(x-5)(x-3)$$

$$5. 16x^2 + 8x + 1 \quad \begin{matrix} 16(1) = 16 \\ 16, 1 \\ 8, 2 \\ 4, 4 \end{matrix}$$

$$16x^2 + 4x + 4x + 1$$

$$4x(4x+1) + (4x+1)$$

$$(4x+1)(4x+1)$$

$$6. 12x^2 + 11x - 5 \quad \begin{matrix} 12(-5) = -60 \\ 60, 1 \\ 30, 2 \\ 20, 3 \\ 15, 4 \\ 10, 6 \\ 12, 5 \end{matrix}$$

$$12x^2 + 15x - 4x - 5$$

$$3x(4x+5) - (4x+5)$$

$$(4x+5)(3x-1)$$

$$7. 3x^2 + 10x - 8 \quad \begin{matrix} 3(-8) = -24 \\ 24, 1 \\ 12, 2 \\ 8, 3 \\ 6, 4 \end{matrix}$$

$$3x^2 + 12x - 2x - 8$$

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

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

$$8. 4x^2 + 11x + 6 \quad \begin{matrix} 4(6) = 24 \\ 24, 1 \\ 12, 2 \\ 8, 3 \\ 6, 4 \end{matrix}$$

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

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

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

$$9. 2x^2 + 13x + 21 \quad \begin{matrix} 2(21) = 42 \\ 42, 1 \\ 21, 2 \\ 14, 3 \\ 6, 7 \end{matrix}$$

$$2x^2 + 6x + 7x + 21$$

$$2x(x+3) + 7(x+3)$$

$$(x+3)(2x+7)$$

$$10. 5x^2 + 17x + 6 \quad \begin{matrix} 5(6) = 30 \\ 30, 1 \\ 15, 2 \\ 10, 3 \\ 6, 5 \end{matrix}$$

$$5x^2 + 15x + 2x + 6$$

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

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