

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

This type of trinomial is different from the simpler case because the coefficient of x^2 is not 1.

Examples of Trinomials in the Form $ax^2 + bx + c$

Trinomial	a	b	c
$6a^2 + 7a - 24$	6	7	-24
$3p^2 - 16p + 5$	3	-16	5
$9x^2 + 12x + 4$	9	12	4

Note: The coefficient of x^2 is not 1, and we cannot make it 1 by factoring something out initially.

General Factoring Method

To factor $ax^2 + bx + c$:

1. Look at the factors of the first term (a).
 2. Look at the factors of the last term (c).
 3. Use the signs of the terms to guide factoring.
 4. Check the middle term (bx) using trial combinations.
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Possible Factoring Patterns

Trinomial Sign Pattern	Factor Form
$ax^2 + bx + c$	$(x +)(x +)$
$ax^2 - bx + c$	$(x -)(x -)$
$ax^2 + bx - c$	$(x +)(x -)$ or $(x -)(x +)$
$ax^2 - bx - c$	$(x -)(x +)$ or $(x +)(x -)$

Tip: When the binomial signs differ, carefully check which factor is positive and which is negative.

Step-by-Step Example 1

Problem: Factor $6a^2 + 7a - 24$

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

Step 1: Check for a GCF

No common factor among terms.

Step 2: Determine signs

The last term is negative \rightarrow binomials will have different signs.

Step 3: Identify possible factors

- Factors of 6: (1,6), (2,3)

- Factors of -24: (1,-24), (2,-12), (3,-8), (4,-6), and their opposites

Step 4: Test combinations (trial and error with FOIL)

Try:

- $(2a + 3)(3a - 8)$

- $(2a - 3)(3a + 8)$

Step 5: Expand to check

$(2a - 3)(3a + 8) = 6a^2 + 7a - 24$ ✓

Final Answer:

$(2a - 3)(3a + 8)$

Practice Problems

Factor each trinomial:

1. $2x^2 + 5x + 2$

2. $3y^2 - 10y - 8$

3. $4m^2 + 11m + 6$

4. $5p^2 - 9p - 2$

5. $6x^2 + 13x + 6$

Answer Key

1. $(2x + 1)(x + 2)$

2. $(3y + 2)(y - 4)$

3. $(4m + 3)(m + 2)$

4. $(5p + 1)(p - 2)$

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