

Factoring Trinomials: $ax^2 + bx + c$

Quick Review and Helpful Hints

When $a \neq 1$: Use the **AC method** (also called “splitting the middle term”).

Step 1 Factor out the GCF first (if there is one).

Step 2 Multiply $a \cdot c$ to get the “AC product.”

Step 3 Find two numbers whose product is ac and whose sum is b .

Step 4 Rewrite the middle term bx as the sum of those two terms.

Step 5 Factor by grouping (group into two pairs, factor each pair, then factor the common binomial).

Step 6 Check by FOILing.

Example: $6x^2 + 11x + 4$. $ac = 24$. Numbers: 3 and 8 ($3 \cdot 8 = 24$, $3 + 8 = 11$).

$$6x^2 + 3x + 8x + 4 = 3x(2x + 1) + 4(2x + 1) = (3x + 4)(2x + 1).$$

Q Example: Factor: $2x^2 + 7x + 3$.

👉 $ac = 2 \cdot 3 = 6$. Find two numbers with product 6 and sum 7: 1 and 6.

Rewrite: $2x^2 + x + 6x + 3$.

Group: $x(2x + 1) + 3(2x + 1)$.

Factor: $(x + 3)(2x + 1)$.

Check: $(x + 3)(2x + 1) = 2x^2 + x + 6x + 3 = 2x^2 + 7x + 3 \checkmark$

💡 Answer: $(x + 3)(2x + 1)$

✂ Practice Problems

Factor completely. Remember to take out the GCF first when possible.

1. $3x^2 + 10x + 8 =$ _____

7. $10x^2 - 19x + 6 =$ _____

2. $2x^2 + 9x + 4 =$ _____

8. $8x^2 + 14x + 3 =$ _____

3. $5x^2 - 13x + 6 =$ _____

9. $6x^2 - 18x + 12 =$ _____

4. $3x^2 - x - 2 =$ _____

10. $2x^2 + 5x - 12 =$ _____

5. $4x^2 + 4x - 3 =$ _____

11. $9x^2 - 6x + 1 =$ _____

6. $6x^2 + x - 12 =$ _____

12. $12x^2 + 8x - 4 =$ _____

✍ Word Problems

13. The area of a rectangle is $6x^2 + 13x + 5$ square inches. Factor to find expressions for the length and width. _____

14. A diver's height above the water is $h = -2t^2 + 5t + 3$ (in meters). Factor to find when the diver hits the water ($h = 0$).
