# Factoring Trinomials ax2 bx c

| Name: _____ | Date: _____ | Score: _____ / 24 |
|---|---|---|

## Quick Review

To factor $ax^2 + bx + c$ when $a \neq 1$, use the **AC method**: **(1)** multiply $a \cdot c$; **(2)** find two numbers that multiply to $ac$ and add to $b$; **(3)** split the middle term using those numbers; **(4)** factor by grouping. **Always factor out the GCF first** if there is one. Some trinomials are prime. As a shortcut for small $a$, you can also use trial and error: write $(\_x + \_)(\_x + \_)$ and try integer pairs for each blank until FOIL gives the original. The AC method is more systematic and almost always works when an integer factoring exists.

## PRACTICE

*Factor each trinomial.*

**1.** $2x^2 + 5x + 3$ _____

**2.** $3x^2 + 10x + 8$ _____

**3.** $2x^2 - 7x + 3$ _____

**4.** $5x^2 + 11x + 2$ _____

**5.** $3x^2 - 5x - 2$ _____

**6.** $6x^2 + 5x - 6$ _____

**7.** $4x^2 + 8x + 3$ _____

**8.** $2x^2 + x - 1$ _____

**9.** $3x^2 + 8x + 4$ _____

**10.** $5x^2 - 13x + 6$ _____

**11.** $4x^2 - 4x + 1$ _____

**12.** $9x^2 + 12x + 4$ _____

**13.** $6x^2 + 7x + 2$ _____

**14.** $8x^2 - 2x - 3$ _____

**15.** $2x^2 + 9x + 10$ _____

**16.** $3x^2 - 7x + 2$ _____

**17.** $4x^2 + 3x - 7$ _____

**18.** $6x^2 - 13x + 6$ _____

**19.** $10x^2 + 9x - 9$ _____

**20.** $2x^2 + 3x + 5$ _____

## Word Problems

**21.** A projectile model reaches ground level when $2t^2 + 5t - 3 = 0$. Factor to find the positive time.

_____

**22.** A rectangular sign has area $6x^2 + 7x + 2$ square feet. Factor to find possible length and width expressions.

_____

**23.** A fundraiser's break-even model is $3x^2 - 2x - 1 = 0$. Factor to find the values of $x$ where profit is zero.

_____

**24.** A rectangular sign has area $5x^2 + 12x + 4$ square feet. Factor to find possible side expressions.

_____

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# Answer Keys

1. $(2x+3)(x+1)$
2. $(3x+4)(x+2)$
3. $(2x-1)(x-3)$
4. $(5x+1)(x+2)$
5. $(3x+1)(x-2)$
6. $(3x-2)(2x+3)$
7. $(2x+1)(2x+3)$
8. $(2x-1)(x+1)$
9. $(3x+2)(x+2)$
10. $(5x-3)(x-2)$
11. $(2x-1)^2$
12. $(3x+2)^2$
13. $(3x+2)(2x+1)$
14. $(4x-3)(2x+1)$
15. $(2x+5)(x+2)$
16. $(3x-1)(x-2)$
17. $(4x+7)(x-1)$
18. $(3x-2)(2x-3)$
19. $(5x-3)(2x+3)$
20. prime
21. $t=\frac{1}{2}$ second
22. $(3x+2)(2x+1)$
23. $x=1$ or $x=-\frac{1}{3}$
24. $(5x+2)(x+2)$

## Step-by-Step Tutor Notes

1. $ac=6$, pair $2,3$. Split: $2x^2+2x+3x+3=2x(x+1)+3(x+1)$.
2. Focus on the main idea of the problem, then simplify carefully. $ac=24$, pair $4,6$. So the answer is $(3x+4)(x+2)$.
3. Focus on the main idea of the problem, then simplify carefully. $ac=6$, pair $-1,-6$. So the answer is $(2x-1)(x-3)$.
4. Take it one clear step at a time and keep the original question in mind. $ac=10$, pair $1,10$. So the answer is $(5x+1)(x+2)$.
5. Start with the definition the problem is testing, then apply it directly. $ac=-6$, pair $1,-6$. So the answer is $(3x+1)(x-2)$.
6. $ac=-36$, pair $-4,9$. Split: $6x^2-4x+9x-6=2x(3x-2)+3(3x-2)$.
7. This is a good place to slow down, check the notation, and simplify cleanly. $ac=12$, pair $2,6$. So the answer is $(2x+1)(2x+3)$.
8. Start with the definition the problem is testing, then apply it directly. $ac=-2$, pair $-1,2$. So the answer is $(2x-1)(x+1)$.
9. Start with the definition the problem is testing, then apply it directly. $ac=12$, pair $2,6$. So the answer is $(3x+2)(x+2)$.
10. Take it one clear step at a time and keep the original question in mind. $ac=30$, pair $-3,-10$. So the answer is $(5x-3)(x-2)$.
11. Use the clue in the question first, then let the arithmetic finish the job. Perfect square trinomial. So the answer is $(2x-1)^2$.
12. Use the clue in the question first, then let the arithmetic finish the job. Perfect square: $(3x)^2+2(3x)(2)+4$. So the answer is $(3x+2)^2$.
13. Use the clue in the question first, then let the arithmetic finish the job. $ac=12$, pair $3,4$. So the answer is $(3x+2)(2x+1)$.
14. Use the clue in the question first, then let the arithmetic finish the job. $ac=-24$, pair $-6,4$. So the answer is $(4x-3)(2x+1)$.
15. Focus on the main idea of the problem, then simplify carefully. $ac=20$, pair $4,5$. So the answer is $(2x+5)(x+2)$.
16. Focus on the main idea of the problem, then simplify carefully. $ac=6$, pair $-1,-6$. So the answer is $(3x-1)(x-2)$.
17. Focus on the main idea of the problem, then simplify carefully. $ac=-28$, pair $7,-4$. So the answer is $(4x+7)(x-1)$.
18. Take it one clear step at a time and keep the original question in mind. $ac=36$, pair $-4,-9$. So the answer is $(3x-2)(2x-3)$.
19. This is a good place to slow down, check the notation, and simplify cleanly. $ac=-90$, pair $-6,15$. So the answer is $(5x-3)(2x+3)$.
20. Take it one clear step at a time and keep the original question in mind. $ac=10$, no pair sums to $3$. So the answer is prime.
21. Factor: $(2t-1)(t+3)=0$. So $t=\frac{1}{2}$ or $t=-3$. Time cannot be negative, so the positive time is $\frac{1}{2}$ second.
22. Name the quantities first so the model is easy to read. Using AC method or trial and error: $(3x+2)(2x+1)$.
23. First identify the feature of the graph or equation that matches the wording of the question. Factor: $(3x+1)(x-1)=0$. So $x=-\frac{1}{3}$ or $x=1$. That leads to $x=1$ or $x=-\frac{1}{3}$.
24. $ac=20$, pair $2,10$. Split: $5x^2+2x+10x+4=x(5x+2)+2(5x+2)=(5x+2)(x+2)$.

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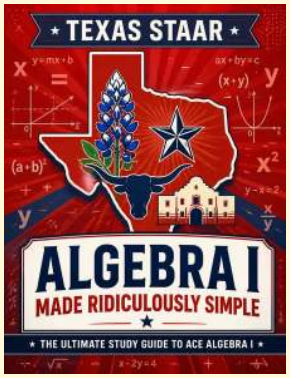


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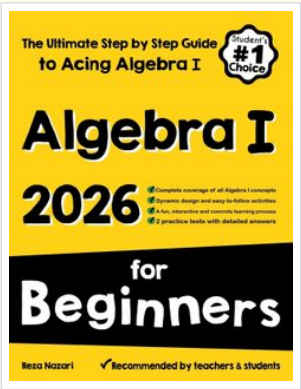


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