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

Algebra 1 •Section 8.3

Name: ______	Date: ______	Score: ____ / 12

Quick Review and Helpful Hints

Polynomial work is pattern work. Keep like terms together, apply exponent rules only when the bases match, and check factoring by multiplying the factors back together.

▷ **Example:** Factor $x^2 + 9x + 20$.

Work: Look for two numbers that multiply to 20 and add to 9. The numbers are 4 and 5.

★ **Answer:** $(x + 4)(x + 5)$

Practice Problems

Solve each problem. Show enough work that another student could follow your thinking.

1. Factor $2x^2 + 7x + 3$. ________
2. Factor $3x^2 + 10x + 8$. ________
3. Factor $4x^2 - 12x + 9$. ________
4. Factor $6x^2 + x - 2$. ________
5. Factor $5x^2 - 13x + 6$. ________
6. Factor $2x^2 - 9x + 10$. ________
7. Factor $3x^2 - 12x$. ________
8. Factor $4x^2 - 25$. ________
9. Factor $2x^2 + 5x + 5$ over the integers. ________
10. Factor $8x^2 + 14x + 3$. ________

Word Problems

11. A rectangle has area $3x^2 + 17x + 10$. Factor it. ________
12. A projectile equation factors from $2t^2 - 11t + 5$. Factor it. ________

Answer Keys

1. $(2x+1)(x+3)$
2. $(3x+4)(x+2)$
3. $(2x-3)^2$
4. $(3x+2)(2x-1)$
5. $(5x-3)(x-2)$
6. $(2x-5)(x-2)$
7. $3x(x-4)$
8. $(2x-5)(2x+5)$
9. Prime
10. $(4x+1)(2x+3)$
11. $(3x+2)(x+5)$
12. $(2t-1)(t-5)$

Step-by-Step Explanations

1. Splitting the middle as $6x+x$ lets you group; check that $2x^2+6x+x+3$ rebuilds it.
2. Test the pairing: the inner and outer products $6x$ and $4x$ should total $10x$.
3. The ends $4x^2$ and 9 are squares, and $-12x$ matches twice their product — a perfect square.
4. With a leading 6, try factors until the middles $-3x$ and $4x$ add to just x.
5. Both signs go negative for a positive constant; check that $-10x-3x$ gives $-13x$.
6. Aim for middle terms that sum to $-9x$ — here $-4x$ and $-5x$ do exactly that.
7. No constant term here, so start by pulling the shared $3x$ out front.
8. Two perfect squares with a minus between them — classic difference of squares.
9. No integer binomials can produce both the $5x$ middle and the 5 constant, so it's prime.
10. Verify the split: the cross products $12x$ and $2x$ combine into $14x$.
11. Breaking it apart gives $3x^2+15x+2x+10$, which confirms the factors.
12. Both middle terms turn out negative: $-10t$ and $-t$ stack into $-11t$.

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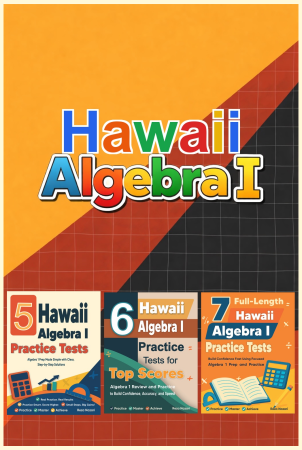

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