Special Products of Polynomials

Algebra 1 •Section 7.4

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. Expand $(x + 5)^2$.

_____

2. Expand $(x - 7)^2$.

_____

3. Expand $(2x + 3)^2$.

_____

4. Expand $(3a - 4)^2$.

_____

5. Multiply $(x + 6)(x - 6)$.

_____

6. Multiply $(5y + 2)(5y - 2)$.

_____

7. Expand $(m + \frac{1}{2})^2$.

_____

8. Expand $(4p - 1)^2$.

_____

9. Multiply $(2x + 9)(2x - 9)$.

_____

10. Expand $(x - 10)^2$.

_____

Word Problems

11. A square garden side is $x + 4$. Write its area.

_____

12. A frame has outer side $x + 3$ and inner side $x - 3$. Multiply to compare areas.

_____

Answer Keys

1. $x^2 + 10x + 25$
2. $x^2 - 14x + 49$
3. $4x^2 + 12x + 9$
4. $9a^2 - 24a + 16$
5. $x^2 - 36$
6. $25y^2 - 4$
7. $m^2 + m + \frac{1}{4}$
8. $16p^2 - 8p + 1$
9. $4x^2 - 81$
10. $x^2 - 20x + 100$
11. $x^2 + 8x + 16$
12. $x^2 - 9$

Step-by-Step Explanations

1. Squaring a sum follows a pattern: first squared, twice the product, last squared.
2. The middle is twice x times -7, which lands you on $-14x$.
3. Square the front, double the product for the middle, square the back — done.
4. Doubling the product gives $2(3a)(-4) = -24a$ for that center term.
5. These are conjugates, so the middle terms wipe each other out, leaving a difference of squares.
6. Same sign, opposite sign — that's the $a^2 - b^2$ shortcut, so just square each piece.
7. Double the product $m \cdot \frac{1}{2}$ to get the middle m, then square the $\frac{1}{2}$.
8. Walk the pattern: $4p$ squared, twice $(4p)(-1)$, then 1 squared.
9. Because the signs are opposite, the cross terms vanish and only the squares survive.
10. That center term is twice x times -10, giving you $-20x$.
11. A square's area is its side squared, and $(x + 4)^2$ is a perfect-square trinomial.
12. Those conjugate sides multiply into a clean difference of squares.

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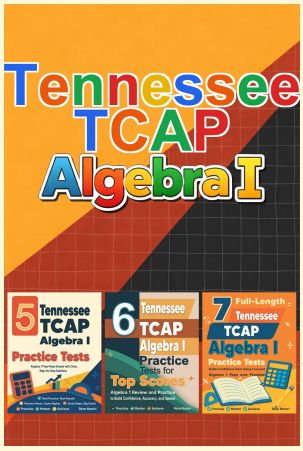

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