Multiplying Polynomials

Name: _____	Date: _____	Score: _____ / 24

Quick Review

To multiply polynomials, use the **distributive property** — every term in the first polynomial multiplies every term in the second. For **monomial** × **polynomial**: distribute the single term across. For **binomial** × **binomial**: **FOIL** (First, Outer, Inner, Last) or use the box method. For larger polynomials: distribute each term carefully and then combine like terms. When multiplying powers of the same variable, *add* the exponents: $x^a \cdot x^b = x^{a+b}$. The most common errors: forgetting to distribute to every term, or missing a sign change with negatives.

PRACTICE

Multiply each expression.

1. $2x(x+3)$ _____
2. $3x(x^2-x+1)$ _____
3. $(x+2)(x+5)$ _____
4. $(x-3)(x+4)$ _____
5. $(x-1)(x-7)$ _____
6. $(2x+1)(x-3)$ _____
7. $(3x-2)(x+4)$ _____
8. $(x+5)^2$ _____
9. $(x-4)^2$ _____
10. $(x+3)(x-3)$ _____
11. $(2x+1)^2$ _____
12. $-x(x+5)$ _____
13. $(x+1)(x^2+2x+1)$ _____
14. $(2x-3)(2x+3)$ _____
15. $(x+y)(x-y)$ _____
16. $3(x+2)(x-1)$ _____
17. $(x-2)^3$ _____
18. $4x^2(x-1)$ _____
19. $(x+a)(x+b)$ _____
20. $(x-1)(x+1)(x^2+1)$ _____

♦ Word Problems

21. A rectangular garden has length $x+5$ feet and width $x+2$ feet. Write the area in expanded form.

_____

22. A square tile has side length $x-3$ inches. Write its area in expanded form.

_____

23. A rectangular courtyard has side expressions $(x+2)$ meters and $(x-2)$ meters. Write the area in expanded form.

_____

24. A pool's length is $2x+1$ ft and its width is $x-3$ ft. Write the area in expanded form.

_____

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Answer Keys

1. $2x^2 + 6x$
2. $3x^3 - 3x^2 + 3x$
3. $x^2 + 7x + 10$
4. $x^2 + x - 12$
5. $x^2 - 8x + 7$
6. $2x^2 - 5x - 3$
7. $3x^2 + 10x - 8$
8. $x^2 + 10x + 25$
9. $x^2 - 8x + 16$
10. $x^2 - 9$
11. $4x^2 + 4x + 1$
12. $-x^2 - 5x$
13. $x^3 + 3x^2 + 3x + 1$
14. $4x^2 - 9$
15. $x^2 - y^2$
16. $3x^2 + 3x - 6$
17. $x^3 - 6x^2 + 12x - 8$
18. $4x^3 - 4x^2$
19. $x^2 + (a + b)x + ab$
20. $x^4 - 1$
21. $x^2 + 7x + 10$
22. $x^2 - 6x + 9$
23. $x^2 - 4$
24. $2x^2 - 5x - 3$

Step-by-Step Tutor Notes

1. Focus on the main idea of the problem, then simplify carefully. Distribute: $2x \cdot x + 2x \cdot 3$. So the answer is $2x^2 + 6x$.
2. Use the clue in the question first, then let the arithmetic finish the job. $3x$ hits each term. So the answer is $3x^3 - 3x^2 + 3x$.
3. Start with the definition the problem is testing, then apply it directly. FOIL. So the answer is $x^2 + 7x + 10$.
4. Start with the definition the problem is testing, then apply it directly. $-3+4 = 1$ for middle term. So the answer is $x^2 + x - 12$.
5. Focus on the main idea of the problem, then simplify carefully. Both negatives: middle $-1 - 7 = -8$; product $(-1)(-7) = 7$. So the answer is $x^2 - 8x + 7$.
6. Use the clue in the question first, then let the arithmetic finish the job. FOIL: $2x^2 - 6x + x - 3$. So the answer is $2x^2 - 5x - 3$.
7. Focus on the main idea of the problem, then simplify carefully. FOIL: $3x^2 + 12x - 2x - 8$. So the answer is $3x^2 + 10x - 8$.
8. Take it one clear step at a time and keep the original question in mind. $(x + 5)(x + 5)$. So the answer is $x^2 + 10x + 25$.
9. Take it one clear step at a time and keep the original question in mind. Square of binomial. So the answer is $x^2 - 8x + 16$.
10. Take it one clear step at a time and keep the original question in mind. Difference of squares pattern. So the answer is $x^2 - 9$.
11. Take it one clear step at a time and keep the original question in mind. $(2x)^2 + 2(2x)(1) + 1^2$. So the answer is $4x^2 + 4x + 1$.
12. Use the clue in the question first, then let the arithmetic finish the job. Both terms get negated. So the answer is $-x^2 - 5x$.
13. This is a good place to slow down, check the notation, and simplify cleanly. Distribute x and 1 over the trinomial. So the answer is $x^3 + 3x^2 + 3x + 1$.
14. Use the clue in the question first, then let the arithmetic finish the job. Difference of squares: $(2x)^2 - 3^2$. So the answer is $4x^2 - 9$.
15. This is a good place to slow down, check the notation, and simplify cleanly. Classic difference of squares. So the answer is $x^2 - y^2$.
16. This is a good place to slow down, check the notation, and simplify cleanly. FOIL first: $x^2 + x - 2$. Then $\times 3$. So the answer is $3x^2 + 3x - 6$.
17. Take it one clear step at a time and keep the original question in mind. $(x - 2)^2 = x^2 - 4x + 4$, then times $(x - 2)$: distribute. So the answer is $x^3 - 6x^2 + 12x - 8$.
18. Focus on the main idea of the problem, then simplify carefully. $4x^3 - 4x^2$. So the answer is $4x^3 - 4x^2$.
19. Start with the definition the problem is testing, then apply it directly. FOIL: middle term sum, last term product. So the answer is $x^2 + (a + b)x + ab$.
20. $(x - 1)(x + 1) = x^2 - 1$. Then $(x^2 - 1)(x^2 + 1) = x^4 - 1$. (Difference of squares twice.).
21. Area = length $\times$ width $= (x+5)(x+2) = x^2+2x+5x+10 = x^2+7x+10$.
22. Set up the model from the story, then calculate carefully. Area $= (x - 3)^2 = x^2 - 6x + 9$.
23. Difference of squares: $(x + a)(x - a) = x^2 - a^2$. With $a = 2$: $x^2 - 4$.
24. Set up the model from the story, then calculate carefully. $(2x + 1)(x - 3) = 2x^2 - 6x + x - 3 = 2x^2 - 5x - 3$.

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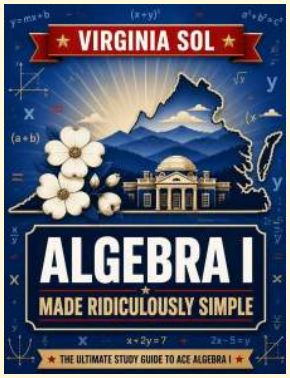

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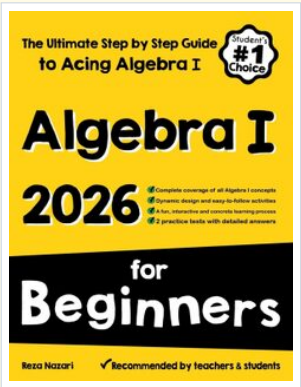

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