Adding and Subtracting Polynomials

Name: _____	Date: _____	Score: _____ / 24

Quick Review

A **polynomial** is a sum of terms, each made of a constant and a variable raised to a non-negative integer power. The **degree** is the highest exponent. Like terms have the same variable raised to the same power — those are the ones you combine. To **add** polynomials, drop the parentheses and combine like terms. To **subtract**, distribute the minus sign across every term in the second polynomial first (this is the single most common mistake), then combine. It's usually clearest to align like terms in columns or to color-code them mentally.

PRACTICE

Add or subtract.

1. $(x+3)+(2x+5)$ _____

2. $(2x^2+x)+(x^2-x)$ _____

3. $(x^2+3x+2)+(2x^2-x+5)$ _____

4. $(5x-2)-(3x+1)$ _____

5. $(x^2+4)-(x^2-7)$ _____

6. $(3x^2-x)-(x^2-x)$ _____

7. $(4x^3+2x)-(x^3-x)$ _____

8. $(x+y)+(2x-y)$ _____

9. $(2x^2+3x+1)+(x^2+x-4)$ _____

10. $(5x^2-2x)-(3x^2+x)$ _____

11. $(7x-1)+(2x+1)$ _____

12. $(x^2-3x+5)+(2x^2+3x-5)$ _____

13. $(6x^3-2x^2+x)-(2x^3-x^2+2x)$ _____

14. $(a+b)-(a-b)$ _____

15. $(x^2)+(x^2)$ _____

16. $-(x-3)+(x+3)$ _____

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

18. $2(x+1)+(x-2)$ _____

19. $(x^2+5)+x$ _____

20. $(x^3-x)+(x-x^3)$ _____

♦ Word Problems

21. A rectangular garden has length x^2+3 feet and width $x+1$ feet. Write and simplify an expression for its perimeter.

_____

22. A school fundraiser tracks revenue with $R=8x^2+50x$ and cost with $C=3x^2+20x+100$. Write the profit model $P=R-C$.

_____

23. Two storage boxes have volume models $V_1=2x^3+x$ and $V_2=x^3-x$. Write a simplified expression for their combined volume.

_____

24. A design model is split into two polynomial parts. The full model is $5x^2+2x-3$, and one part is x^2+5x-1. Find the missing part.

_____

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Answer Keys

1. $3x + 8$
2. $3x^2$
3. $3x^2 + 2x + 7$
4. $2x - 3$
5. 11
6. $2x^2$
7. $3x^3 + 3x$
8. $3x$
9. $3x^2 + 4x - 3$
10. $2x^2 - 3x$
11. $9x$
12. $3x^2$
13. $4x^3 - x^2 - x$
14. $2b$
15. $2x^2$
16. 6
17. 0
18. $3x$
19. $x^2 + x + 5$
20. 0
21. $2x^2 + 2x + 8$
22. $P = 5x^2 + 30x - 100$
23. $3x^3$
24. $4x^2 - 3x - 2$

Step-by-Step Tutor Notes

1. Focus on the main idea of the problem, then simplify carefully. Combine: $x + 2x = 3x$; $3 + 5 = 8$. So the answer is $3x + 8$.
2. Start with the definition the problem is testing, then apply it directly. $3x^2 + 0x = 3x^2$. So the answer is $3x^2$.
3. Use the clue in the question first, then let the arithmetic finish the job. Sort by degree. So the answer is $3x^2 + 2x + 7$.
4. This is a good place to slow down, check the notation, and simplify cleanly. $5x - 3x = 2x$; $-2 - 1 = -3$. So the answer is $2x - 3$.
5. Start with the definition the problem is testing, then apply it directly. $x^2 - x^2 = 0$; $4 - (-7) = 11$. So the answer is 11.
6. This is a good place to slow down, check the notation, and simplify cleanly. $2x^2 + 0x$. So the answer is $2x^2$.
7. Take it one clear step at a time and keep the original question in mind. $4x^3 - x^3 = 3x^3$; $2x - (-x) = 3x$. So the answer is $3x^3 + 3x$.
8. Take it one clear step at a time and keep the original question in mind. $y - y = 0$. So the answer is $3x$.
9. Start with the definition the problem is testing, then apply it directly. Combine by degree. So the answer is $3x^2 + 4x - 3$.
10. Take it one clear step at a time and keep the original question in mind. $5 - 3 = 2$; $-2 - 1 = -3$. So the answer is $2x^2 - 3x$.
11. Focus on the main idea of the problem, then simplify carefully. Constants cancel. So the answer is $9x$.
12. Focus on the main idea of the problem, then simplify carefully. All other terms cancel. So the answer is $3x^2$.
13. This is a good place to slow down, check the notation, and simplify cleanly. Distribute minus, then combine. So the answer is $4x^3 - x^2 - x$.
14. This is a good place to slow down, check the notation, and simplify cleanly. $a - a = 0$; $b - (-b) = 2b$. So the answer is $2b$.
15. This is a good place to slow down, check the notation, and simplify cleanly. Coefficients $1 + 1 = 2$. So the answer is $2x^2$.
16. Use the clue in the question first, then let the arithmetic finish the job. $-x + x = 0$; $3 + 3 = 6$. So the answer is 6.
17. Look for the key feature the question asks about, such as a zero, intercept, or vertex. Polynomial minus itself is zero. That leads to 0.
18. Use the clue in the question first, then let the arithmetic finish the job. $2x + 2 + x - 2 = 3x$. So the answer is $3x$.
19. Take it one clear step at a time and keep the original question in mind. All different terms — just write them. So the answer is $x^2 + x + 5$.
20. This is a good place to slow down, check the notation, and simplify cleanly. All terms cancel. So the answer is 0.
21. $P = 2(\ell + w) = 2(x^2 + 3 + x + 1) = 2(x^2 + x + 4) = 2x^2 + 2x + 8$.
22. $P = (8x^2 + 50x) - (3x^2 + 20x + 100) = 5x^2 + 30x - 100$ after distributing the minus.
23. Set up the model from the story, then calculate carefully. $(2x^3 + x) + (x^3 - x) = 3x^3$. The x terms cancel.
24. Other = sum − first = $(5x^2 + 2x - 3) - (x^2 + 5x - 1) = 5x^2 - x^2 + 2x - 5x - 3 + 1 = 4x^2 - 3x - 2$.

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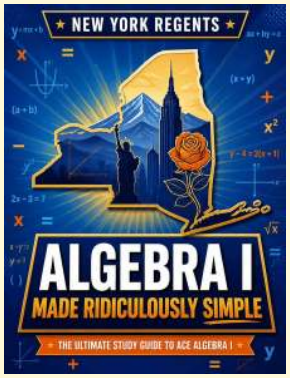

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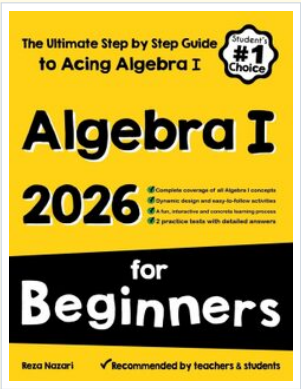

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