Simplifying Polynomial Expressions

Name: _____	Date: _____	Score: _____ / 18

Quick Review and Helpful Hints

To simplify a polynomial, combine *like terms* – terms with the exact same variable and exponent. Add or subtract their coefficients and keep the variable part the same. If there are parentheses, use the distributive property to clear them first, then combine. Write the result in descending order of exponents.

Example: Simplify $3x + 5 + 2x - 1$. **Work:** Group like terms. The x-terms combine: $3x + 2x = 5x$. The constants combine: $5 - 1 = 4$. **Answer:** $5x + 4$

Practice Problems

Simplify each expression by combining like terms.

1. $4x + 3x$ _____

2. $7y - 2y$ _____

3. $5a + 2 - 3a + 4$ _____

4. $2x^2 + 3x^2$ _____

5. $6m - m + 2m$ _____

6. $3x + 5 - x - 2$ _____

7. $4a^2 + 2a - a^2 + 3a$ _____

8. $8 - 3x + x - 5$ _____

9. $2(x + 3) + 4x$ _____

10. $5y^2 - 2y^2 + y$ _____

11. $3(2a - 1) + 5$ _____

12. $7x^2 + 4x - 2x^2 - x$ _____

13. $-2(x - 4) + 3x$ _____

14. $6b + 2b^2 - 3b + b^2$ _____

Word Problems

15. A rectangle's perimeter is found by adding $2(x + 5)$ and $2(3x)$. Simplify the expression. _____

16. Maria buys x books at $\$4$ each and x pens at $\$2$ each, then spends $\$3$ more. Write and simplify the total cost. _____

17. A garden's length is $2x + 3$ and its width is $x - 1$. Write its perimeter, $2(\text{length}) + 2(\text{width})$, in simplest form. _____

18. Simplify the expression $5(a + 2) - 3(a - 1)$. _____

Answer Keys

1. $7x$	**7.** $3a^2 + 5a$	**13.** $x + 8$
2. $5y$	**8.** $-2x + 3$	**14.** $3b^2 + 3b$
3. $2a + 6$	**9.** $6x + 6$	**15.** $8x + 10$
4. $5x^2$	**10.** $3y^2 + y$	**16.** $6x + 3$
5. $7m$	**11.** $6a + 2$	**17.** $6x + 4$
6. $2x + 3$	**12.** $5x^2 + 3x$	**18.** $2a + 13$

Step-by-Step Explanations

1. These are like terms (both have x), so just add the coefficients: $4 + 3 = 7$, giving $7x$.
2. Like terms again: $7 - 2 = 5$, so $5y$.
3. Group like terms: the a-terms give $5a - 3a = 2a$, and the numbers give $2 + 4 = 6$, so $2a + 6$.
4. Both are x^2 terms, so add the coefficients: $2 + 3 = 5$, giving $5x^2$.
5. All are m-terms: $6 - 1 + 2 = 7$, so $7m$ (a lone m counts as $1m$).
6. x-terms: $3x - x = 2x$; numbers: $5 - 2 = 3$. Answer $2x + 3$.
7. Keep unlike powers apart: $4a^2 - a^2 = 3a^2$ and $2a + 3a = 5a$, so $3a^2 + 5a$.
8. x-terms: $-3x + x = -2x$; numbers: $8 - 5 = 3$. Answer $-2x + 3$.
9. Distribute first: $2(x + 3) = 2x + 6$, then add $4x$ to get $6x + 6$.
10. Combine the y^2 terms ($5 - 2 = 3$); the lone y has nothing to pair with, so $3y^2 + y$.
11. Distribute: $3(2a - 1) = 6a - 3$, then $-3 + 5 = 2$, giving $6a + 2$.
12. x^2 terms: $7 - 2 = 5$; x-terms: $4 - 1 = 3$. Answer $5x^2 + 3x$.
13. Distribute the -2 carefully: $-2x + 8$, then add $3x$ to get $x + 8$.
14. b^2 terms: $2 + 1 = 3$; b-terms: $6 - 3 = 3$. Answer $3b^2 + 3b$.
15. Add the two pairs of sides: $2(x + 5) + 2(3x) = 2x + 10 + 6x = 8x + 10$.
16. Books cost $4x$, pens cost $2x$, plus \$3: $4x + 2x + 3 = 6x + 3$.
17. Perimeter $= 2(2x + 3) + 2(x - 1) = 4x + 6 + 2x - 2 = 6x + 4$.
18. Distribute both groups: $5a + 10 - 3a + 3 = 2a + 13$.

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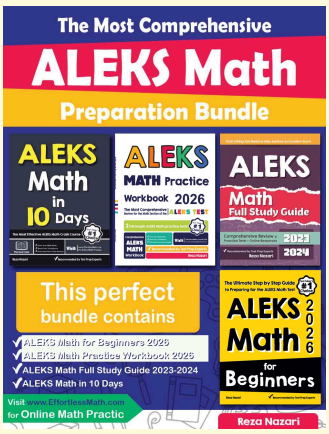

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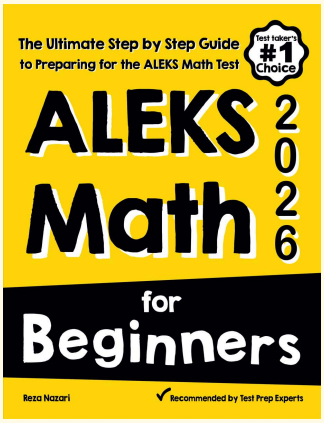

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