Simplifying Variable Expressions

Name: _____	Date: _____	Score: _____ / 18

Quick Review and Helpful Hints

To *simplify* an expression, combine *like terms* – terms with the same variable raised to the same power. First use the *distributive property* to clear parentheses ($a(b + c) = ab + ac$), then add or subtract the like terms. Constants combine with constants.

▷ **Example:** Simplify $3(2x + 4) - 5x + 7$. **Work:** Distribute the 3: $6x + 12 - 5x + 7$. Combine the x-terms: $6x - 5x = x$. Combine the constants: $12 + 7 = 19$. ★ **Answer:** $x + 19$

$3\,(\,x + 2\,)$

$= 3x + 6$

Distribute to each term, then combine.

Practice Problems

Simplify each expression.

1. $2x + 5x$ _____
2. $8a - 3a$ _____
3. $4x + 3 + 2x$ _____
4. $7y - 2 - y + 5$ _____
5. $3(x + 2)$ _____
6. $5(2x - 1)$ _____
7. $2(x + 3) + 4x$ _____
8. $6x - 2(x + 1)$ _____
9. $4(a + 2) + 3(a - 1)$ _____
10. $3x + 2y - x + 4y$ _____
11. $-2(3x - 4)$ _____
12. $5 + 2(x - 3)$ _____
13. $8m - 3(m - 2)$ _____
14. $2(x + 5) + 3(2x - 1)$ _____

Word Problems

15. A rectangle has length $x + 4$ and width 3. Write a simplified expression for its perimeter. _____
16. You buy x shirts at $\$7$ each and one $\$5$ cap. Write a simplified expression for the total cost. _____
17. There are 3 boxes that each hold $(x + 2)$ pencils, plus 4 loose pencils. Write a simplified expression for the total. _____
18. A taxi charges $\$3$ plus $\$2$ per mile, then a $\$4$ coupon is applied. Write a simplified expression for the cost of m miles. _____

Answer Keys

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

Step-by-Step Explanations

1. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is These are like terms, so just add the coefficients: $2x + 5x = 7x$. So the final answer is $7x$.

2. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Both terms have a, so subtract the coefficients: $8a - 3a = 5a$. So the final answer is $5a$.

3. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Group the x-terms and the numbers: $(4x + 2x) + 3 = 6x + 3$. So the final answer is $6x + 3$.

4. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Combine the y-terms ($7y - y = 6y$) and the constants ($-2 + 5 = 3$): $6y + 3$. So the final answer is $6y + 3$.

5. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Distribute the 3 to each term inside: $3 \cdot x + 3 \cdot 2 = 3x + 6$. So the final answer is $3x + 6$.

6. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Distribute the 5: $5 \cdot 2x - 5 \cdot 1 = 10x - 5$. So the final answer is $10x - 5$.

7. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Distribute first: $2x + 6$. Then add the $4x$: $2x + 4x + 6 = 6x + 6$. So the final answer is $6x + 6$.

8. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Distribute the -2: $6x - 2x - 2$. Combine: $4x - 2$. So the final answer is $4x - 2$.

9. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Distribute both: $4a+8$ and $3a-3$. Combine: $(4a+3a)+(8-3) = 7a + 5$. So the final answer is $7a + 5$.

10. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Combine the x-terms ($3x - x = 2x$) and the y-terms ($2y + 4y = 6y$): $2x + 6y$. So the final answer is $2x + 6y$.

11. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is A negative multiplier flips each sign: $-2 \cdot 3x = -6x$ and $-2 \cdot (-4) = +8$, giving $-6x + 8$. So the final answer is $-6x + 8$.

12. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Distribute: $5 + 2x - 6$. Combine the constants $5 - 6 = -1$: $2x - 1$. So the final answer is $2x - 1$.

13. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Distribute the -3: $8m - 3m + 6$. Combine: $5m + 6$. So the final answer is $5m + 6$.

14. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Distribute both: $2x + 10$ and $6x - 3$. Combine: $(2x + 6x) + (10 - 3) = 8x + 7$. So the final answer is $8x + 7$.

15. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Perimeter is $2(\text{length} + \text{width}) = 2((x + 4) + 3) = 2(x + 7) = 2x + 14$. So the final answer is $2x + 14$.

16. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Each shirt costs $\$7$, so x shirts cost $7x$; add the $\$5$ cap: $7x + 5$. So the final answer is $7x + 5$.

17. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Three boxes give $3(x + 2) = 3x + 6$ pencils; add the 4 loose ones: $3x + 10$. So the final answer is $3x + 10$.

18. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is The cost is $3 + 2m$, then subtract the $\$4$ coupon: $3 + 2m - 4 = 2m - 1$. So the final answer is $2m - 1$.

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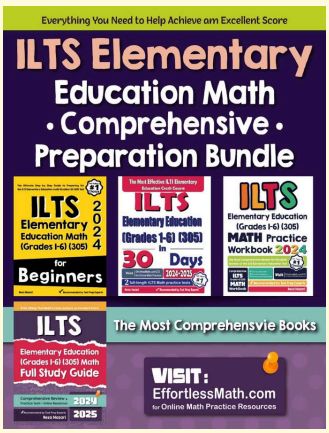

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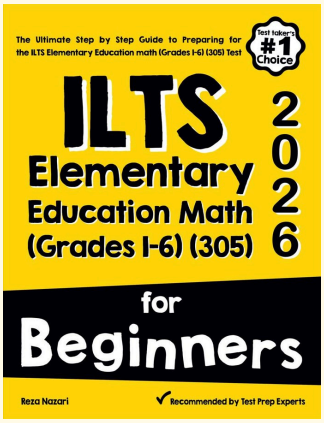

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