

The Distributive Property

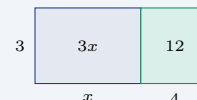
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Quick Review and Helpful Hints

The distributive property says $a(b + c) = ab + ac$: multiply the factor outside the parentheses by *each* term inside, then combine. It works with subtraction too: $a(b - c) = ab - ac$. A negative factor in front flips the sign of every term inside.

▶ **Example:** Expand $3(x + 4)$. **Work:** Multiply the 3 by each term inside: $3 \cdot x = 3x$ and $3 \cdot 4 = 12$. Then write them as a sum.

★ **Answer:** $3x + 12$



$3(x + 4) = 3x + 12.$

Practice Problems

Expand and simplify each expression.

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

Word Problems

15. A garden has 4 rows, and each row has $(x + 3)$ plants. Write and simplify the total number of plants. _____
16. A rectangle is 5 units tall and $(2x + 1)$ units wide. Write a simplified expression for its area. _____
17. Each gift bag holds $(x - 2)$ candies. Write and simplify the total for 6 bags. _____
18. For a school fundraiser, one table packs 2 boxes with $(x + 5)$ flyers each and another packs 3 boxes with $(x - 1)$ flyers each. Write a simplified expression for the total flyers. _____



Answer Keys

- | | | |
|--------------|----------------|---------------|
| 1. $2x + 10$ | 7. $-6x + 3$ | 13. $4x - 8$ |
| 2. $4x - 12$ | 8. $7x - 35$ | 14. $7x + 6$ |
| 3. $10x + 5$ | 9. $6a + 8$ | 15. $4x + 12$ |
| 4. $3a - 6$ | 10. $-x - 6$ | 16. $10x + 5$ |
| 5. $-2x - 8$ | 11. $8x + 12y$ | 17. $6x - 12$ |
| 6. $6x + 12$ | 12. $5x - 3$ | 18. $5x + 7$ |

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 Multiply the 2 by each term inside the parentheses: $2 \cdot x = 2x$ and $2 \cdot 5 = 10$. Write them as a sum: $2x + 10$. So the final answer is $2x + 10$.
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 Distribute the 4: $4 \cdot x = 4x$ and $4 \cdot 3 = 12$. Keep the subtraction: $4x - 12$. So the final answer is $4x - 12$.
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 Multiply the 5 by each term: $5 \cdot 2x = 10x$ and $5 \cdot 1 = 5$, giving $10x + 5$. So the final answer is $10x + 5$.
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 Distribute the 3: $3 \cdot a = 3a$ and $3 \cdot 2 = 6$, so $3a - 6$. So the final answer is $3a - 6$.
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 A negative factor flips each sign inside: $-2 \cdot x = -2x$ and $-2 \cdot 4 = -8$, giving $-2x - 8$. So the final answer is $-2x - 8$.
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 Multiply the 6 by each term: $6 \cdot x = 6x$ and $6 \cdot 2 = 12$, so $6x + 12$. So the final answer is $6x + 12$.
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 -3 : $-3 \cdot 2x = -6x$ and $-3 \cdot (-1) = +3$, giving $-6x + 3$. So the final answer is $-6x + 3$.
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 Multiply the 7 by each term: $7 \cdot x = 7x$ and $7 \cdot 5 = 35$, so $7x - 35$. So the final answer is $7x - 35$.
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 the 2: $2 \cdot 3a = 6a$ and $2 \cdot 4 = 8$, giving $6a + 8$. So the final answer is $6a + 8$.
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 The -1 in front flips both signs: $-x - 6$. So the final answer is $-x - 6$.
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 Multiply the 4 by each term: $4 \cdot 2x = 8x$ and $4 \cdot 3y = 12y$, giving $8x + 12y$. So the final answer is $8x + 12y$.
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 First distribute: $5 \cdot x - 5 \cdot 1 = 5x - 5$. Then combine the numbers: $-5 + 2 = -3$, giving $5x - 3$. So the final answer is $5x - 3$.
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 -4 : $-4 \cdot 2 = -8$ and $-4 \cdot (-x) = +4x$. Written in order: $4x - 8$. So the final answer is $4x - 8$.
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 the 3: $3x + 6$. Then add the $4x$: $3x + 4x = 7x$, giving $7x + 6$. So the final answer is $7x + 6$.
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 Each of the 4 rows has $(x + 3)$ plants, so the total is $4(x + 3) = 4x + 12$ plants. So the final answer is $4x + 12$.
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 Area is height times width: $5(2x + 1) = 5 \cdot 2x + 5 \cdot 1 = 10x + 5$. So the final answer is $10x + 5$.
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 Six bags each hold $(x - 2)$ candies: $6(x - 2) = 6x - 12$. So the final answer is $6x - 12$.
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 Distribute both groups: $2(x + 5) = 2x + 10$ and $3(x - 1) = 3x - 3$. Combine: $2x + 3x = 5x$ and $10 - 3 = 7$, giving $5x + 7$. So the final answer is $5x + 7$.



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