

# The Distributive Property

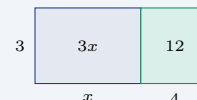
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## Quick Review and Helpful Hints

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.

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

### ◆ 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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