

# The Distributive Property

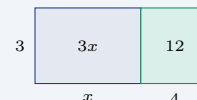
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## Quick Review and Helpful Hints

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.  $2x + 10$

2.  $4x - 12$

3.  $10x + 5$

4.  $3a - 6$

5.  $-2x - 8$

6.  $6x + 12$

7.  $-6x + 3$

8.  $7x - 35$

9.  $6a + 8$

10.  $-x - 6$

11.  $8x + 12y$

12.  $5x - 3$

13.  $4x - 8$

14.  $7x + 6$

15.  $4x + 12$

16.  $10x + 5$

17.  $6x - 12$

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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