

# Simplifying Algebraic Expressions

Algebra 1 • Section 1.3

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Score: \_\_\_\_\_ / 12

## Quick Review and Helpful Hints

Algebra becomes easier when every symbol has a job. Read the operation first, keep signs attached to their terms, and check that each step still means the same thing as the original expression.

▷ **Example:** Simplify  $2(x + 6) + 3x$ .

**Work:** Distribute first:  $2(x + 6) = 2x + 12$ . Then combine like terms:  $2x + 12 + 3x = 5x + 12$ .

★ **Answer:**  $5x + 12$

## ◆ Practice Problems

Solve each problem. Show enough work that another student could follow your thinking.

1. Simplify  $6x + 4x$ . \_\_\_\_\_

6. Simplify  $5(2p + 1) - 3(p - 4)$ . \_\_\_\_\_

2. Simplify  $8a - 3a + 5$ . \_\_\_\_\_

7. Simplify  $\frac{1}{2}(8n - 6)$ . \_\_\_\_\_

3. Simplify  $4(y + 3)$ . \_\_\_\_\_

8. Simplify  $7 - 4(k - 2)$ . \_\_\_\_\_

4. Simplify  $-2(5m - 7)$ . \_\_\_\_\_

9. Simplify  $2(a + 3b) - 5(a - b)$ . \_\_\_\_\_

5. Simplify  $3(x - 4) + 2x$ . \_\_\_\_\_

10. Simplify  $9q - 3(2q + 5)$ . \_\_\_\_\_

## ◆ Word Problems

11. The sides of a triangle are  $x + 2$ ,  $2x - 1$ , and  $3x + 5$ . Find the perimeter expression. \_\_\_\_\_

12. A store sells 4 packs of markers at  $m$  dollars each and gives a \$6 coupon. Write the simplified cost. \_\_\_\_\_



## Answer Keys

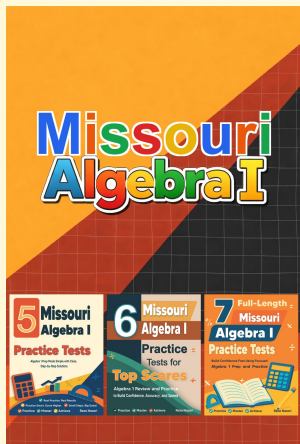
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|----------------|----------------|
| 1. $10x$       | 7. $4n - 3$    |
| 2. $5a + 5$    | 8. $15 - 4k$   |
| 3. $4y + 12$   | 9. $-3a + 11b$ |
| 4. $-10m + 14$ | 10. $3q - 15$  |
| 5. $5x - 12$   | 11. $6x + 6$   |
| 6. $7p + 17$   | 12. $4m - 6$   |

### Step-by-Step Explanations

- Think of these as 6 x's and 4 more x's sitting together — counting them up just gives you  $10x$ .
- Only matching pieces can combine: the  $a$ -terms shrink to  $5a$ , but the lonely 5 has no partner, so it rides along untouched.
- The 4 has to reach every term inside, not just the first one. So it touches  $y$  and the 3, giving  $4y + 12$ .
- Send the  $-2$  to both terms and mind the signs:  $-2 \cdot 5m = -10m$ , and two negatives in  $-2 \cdot (-7)$  flip up to  $+14$ .
- Spread the 3 first to get  $3x - 12$ , then let the  $x$ -terms find each other:  $3x + 2x = 5x$ , leaving  $5x - 12$ .
- Open both sets of parentheses — watch that  $-3$  flip the  $-4$  to  $+12$  — then gather:  $10p - 3p = 7p$  and  $5 + 12 = 17$ .
- Multiplying by  $\frac{1}{2}$  is just splitting each term in half: half of  $8n$  is  $4n$ , and half of 6 is 3.
- That  $-4$  in front belongs to both inside terms, so  $-4(-2)$  becomes  $+8$ . Then  $7 + 8 = 15$ , and the answer is  $15 - 4k$ .
- Distribute carefully and you get  $2a + 6b - 5a + 5b$ . Sort by letter:  $2a - 5a = -3a$  and  $6b + 5b = 11b$ .
- Hand off the  $-3$  first:  $9q - 6q - 15$ . The  $q$ -terms collapse to  $3q$ , and the  $-15$  stands alone.
- Perimeter means add up all three sides. Stack the  $x$ -terms ( $x + 2x + 3x = 6x$ ) and the numbers ( $2 - 1 + 5 = 6$ ) separately.
- Four packs at  $m$  dollars each is  $4m$ . A coupon takes money off, so subtract:  $4m - 6$ .



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