Expanding Expressions with the Distributive Property

Apply the skill to decisions and designs

Name _____ **Date** _____ **Score** _____ / 10

QUICK REVIEW

Distribute the outside factor to every term: $a(b+c) = ab + ac$. For example, $-3(2x-5) = -6x + 15$; the two negative factors in the constant product make a positive result.

Worked example

Example: simplify $7(4x-3)$.

1. Multiply the variable term: $7(4x) = 28x$.
2. Multiply the constant too: $7(-3) = -21$.
3. Combine the two products: $28x - 21$.

Answer: $28x - 21$.

Practice Problems

Show your thinking.

1. Material order: a cost in dollars is modeled by $2(3x+5)$. Rewrite it to expose its coefficient and fixed amount, then find the cost at $x = 2$.

2. Two design formulas: decide whether $3(2x+5)$ and $6x+15$ are equivalent for every x. Give algebra and a numerical check.

3. Packing total: rewrite $4(-x+3)$, then evaluate the rewritten expression at $x = 2$.

4. Cost components: an equivalent form of $5(3x-2)$ has coefficient q on x and constant r. Find (q, r) and then write the resulting expression.

5. Invoice check: a calculator reports 26 for $2(5x+3)$ when $x = 2$. Verify by rewriting first; report any error.

6. Unknown adjustment: $3(4x-1) = 12x + k$. Find k, then write the simplified expression.

7. Locker-code rule: a cost in dollars is modeled by $3(4x-5)$. Rewrite it to expose its coefficient and fixed amount, then find the cost at $x = 2$.

8. Token-count rule: decide whether $-2(3x+4)$ and $-6x-8$ are equivalent for every x. Give algebra and a numerical check.

9. Tile-pack rule: rewrite $5(2x-3)$, then evaluate the rewritten expression at $x = 2$.

10. Meter-offset rule: an equivalent form of $4(5x-7)$ has coefficient q on x and constant r. Find (q, r) and then write the resulting expression.

Answer Key

1. $6x + 10$; cost \$22.00.
2. Yes; they are equivalent.
3. $-4x + 12$; value 4.
4. $(q, r) = (15, -10)$; $15x - 10$.
5. No error; $10x + 6$ evaluates to 26.
6. $k = -3$; $12x - 3$.
7. $12x - 15$; cost \$9.00.
8. Yes; they are equivalent.
9. $10x - 15$; value 5.
10. $(q, r) = (20, -28)$; $20x - 28$.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. Multiply the variable term: $2(3x) = 6x$.
2. Multiply the constant too: $2(5) = 10$.
3. Combine the two products: $6x + 10$.
4. The cost at $x = 2$ is $6(2) + (10) = 22$ dollars.

Problem 2

1. Multiply the variable term: $3(2x) = 6x$.
2. Multiply the constant too: $3(5) = 15$.
3. Combine the two products: $6x + 15$.
4. Numerical check at $x = 2$: both equal $6(2) + (15) = 27$.

Problem 3

1. Multiply the variable term: $4(-1x) = -4x$.
2. Multiply the constant too: $4(3) = 12$.
3. Combine the two products: $-4x + 12$.
4. At $x = 2$: $-4(2) + (12) = 4$.

Problem 4

1. Multiply the variable term: $5(3x) = 15x$.
2. Multiply the constant too: $5(-2) = -10$.
3. Combine the two products: $15x - 10$.

Problem 5

1. Multiply the variable term: $2(5x) = 10x$.
2. Multiply the constant too: $2(3) = 6$.
3. Combine the two products: $10x + 6$.
4. Check: $10(2) + (6) = 26$.

Problem 6

1. Multiply the variable term: $3(4x) = 12x$.
2. Multiply the constant too: $3(-1) = -3$.
3. Combine the two products: $12x - 3$.
4. The variable terms match, so the missing constant is $k = -3$.

Problem 7

1. Multiply the variable term: $3(4x) = 12x$.
2. Multiply the constant too: $3(-5) = -15$.
3. Combine the two products: $12x - 15$.
4. The cost at $x = 2$ is $12(2) + (-15) = 9$ dollars.

Problem 8

1. Multiply the variable term: $-2(3x) = -6x$.
2. Multiply the constant too: $-2(4) = -8$.
3. Combine the two products: $-6x - 8$.
4. Numerical check at $x = 2$: both equal $-6(2) + (-8) = -20$.

Problem 9

1. Multiply the variable term: $5(2x) = 10x$.
2. Multiply the constant too: $5(-3) = -15$.
3. Combine the two products: $10x - 15$.
4. At $x = 2$: $10(2) + (-15) = 5$.

Problem 10

1. Multiply the variable term: $4(5x) = 20x$.
2. Multiply the constant too: $4(-7) = -28$.
3. Combine the two products: $20x - 28$.

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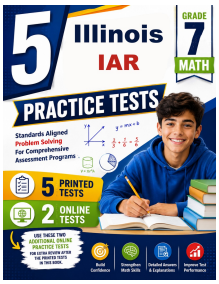

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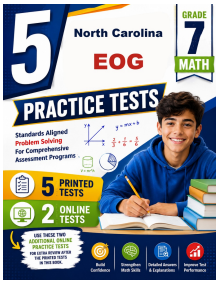

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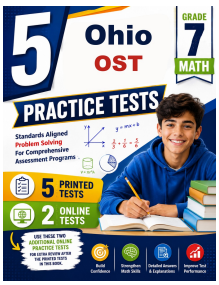

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