Adding and Subtracting Linear Expressions

Spot mistakes, reason, and work backward

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

QUICK REVIEW

Add or subtract matching variable coefficients and constants. A minus before parentheses changes every sign inside:
$(5x + 2) - (2x - 3) = 5x + 2 - 2x + 3 = 3x + 5$.

Worked example

Example: simplify $(7x + 9) + (4x - 3)$.

1. Remove the second parentheses with sign 1: $7x + 9 + (4)x + (-3)$.
2. Variable coefficient: $7 + (4) = 11$.
3. Constant: $9 + (-3) = 6$; result $11x + 6$.
Answer: $11x + 6$.

Practice Problems

Show your thinking.

1. Sign repair: a student claims $(2x + 3) + (3x + 5) = 5x + 9$. Correct the constant term and verify at $x = 2$.

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

3. Calculator audit: a calculator reports 14 for $(4x + 5) + (-x + 3)$ when $x = 2$. Verify by rewriting first; report any error.

4. Rebuild the form: $(5x + 2) - (3x - 2) = 2x + k$. Find k, then write the simplified expression.

5. Explain equivalence: decide whether $(2x + 7) + (5x + 3)$ and $7x + 10$ are equivalent for every x. Give algebra and a numerical check.

6. Evaluation: rewrite $(3x + 4) - (4x - 1)$, then evaluate the rewritten expression at $x = 2$.

7. Locker-code rule: a student claims $(7x - 5) + (-3x + 9) = 4x + 5$. Correct the constant term and verify at $x = 2$.

8. Token-count rule: an equivalent form of $(-4x + 6) - (9x - 2)$ has coefficient q on x and constant r. Find (q, r) and then write the resulting expression.

9. Tile-pack rule: a calculator reports 1 for $(5x - 8) + (-2x + 3)$ when $x = 2$. Verify by rewriting first; report any error.

10. Meter-offset rule: $(8x + 1) - (-5x - 7) = 13x + k$. Find k, then write the simplified expression.

Answer Key

1. Correct form $5x + 8$; correct value 18, not 19.
2. $(q, r) = (1, -7)$; $x - 7$.
3. No error; $3x + 8$ evaluates to 14.
4. $k = 4$; $2x + 4$.
5. Yes; they are equivalent.
6. $-x + 5$; value 3.
7. Correct form $4x + 4$; correct value 12, not 13.
8. $(q, r) = (-13, 8)$; $-13x + 8$.
9. No error; $3x - 5$ evaluates to 1.
10. $k = 8$; $13x + 8$.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. Remove the second parentheses with sign 1: $2x + 3 + (3)x + (5)$.
2. Variable coefficient: $2 + (3) = 5$.
3. Constant: $3 + (5) = 8$; result $5x + 8$.
4. At $x = 2$, the correct value is $5(2) + (8) = 18$; the claim gives 19.

Problem 2

1. Remove the second parentheses with sign -1: $3x - 2 + (-2)x + (-5)$.
2. Variable coefficient: $3 + (-2) = 1$.
3. Constant: $-2 + (-5) = -7$; result $x - 7$.

Problem 3

1. Remove the second parentheses with sign 1: $4x + 5 + (-1)x + (3)$.
2. Variable coefficient: $4 + (-1) = 3$.
3. Constant: $5 + (3) = 8$; result $3x + 8$.
4. Check: $3(2) + (8) = 14$.

Problem 4

1. Remove the second parentheses with sign -1: $5x + 2 + (-3)x + (2)$.
2. Variable coefficient: $5 + (-3) = 2$.
3. Constant: $2 + (2) = 4$; result $2x + 4$.
4. The variable terms match, so the missing constant is $k = 4$.

Problem 5

1. Remove the second parentheses with sign 1: $2x + 7 + (5)x + (3)$.
2. Variable coefficient: $2 + (5) = 7$.
3. Constant: $7 + (3) = 10$; result $7x + 10$.
4. Numerical check at $x = 2$: both equal $7(2) + (10) = 24$.

Problem 6

1. Remove the second parentheses with sign -1: $3x + 4 + (-4)x + (1)$.
2. Variable coefficient: $3 + (-4) = -1$.
3. Constant: $4 + (1) = 5$; result $-x + 5$.
4. At $x = 2$: $-1(2) + (5) = 3$.

Problem 7

1. Remove the second parentheses with sign 1: $7x - 5 + (-3)x + (9)$.
2. Variable coefficient: $7 + (-3) = 4$.
3. Constant: $-5 + (9) = 4$; result $4x + 4$.
4. At $x = 2$, the correct value is $4(2) + (4) = 12$; the claim gives 13.

Problem 8

1. Remove the second parentheses with sign -1: $-4x + 6 + (-9)x + (2)$.
2. Variable coefficient: $-4 + (-9) = -13$.
3. Constant: $6 + (2) = 8$; result $-13x + 8$.

Problem 9

1. Remove the second parentheses with sign 1: $5x - 8 + (-2)x + (3)$.
2. Variable coefficient: $5 + (-2) = 3$.
3. Constant: $-8 + (3) = -5$; result $3x - 5$.
4. Check: $3(2) + (-5) = 1$.

Problem 10

1. Remove the second parentheses with sign -1: $8x + 1 + (5)x + (7)$.
2. Variable coefficient: $8 + (5) = 13$.
3. Constant: $1 + (7) = 8$; result $13x + 8$.
4. The variable terms match, so the missing constant is $k = 8$.

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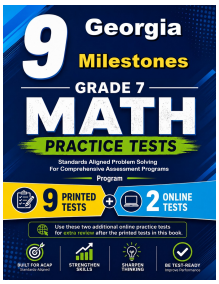

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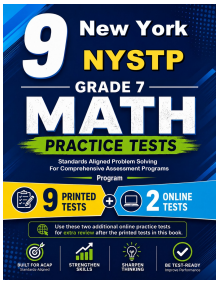

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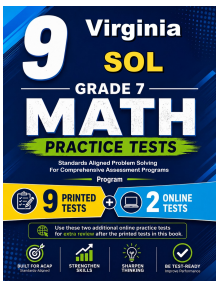

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