# Simplifying Expressions by Combining Like Terms

Spot mistakes, reason, and work backward

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

**QUICK REVIEW**

Like terms have identical variable parts. Add their coefficients; keep constants separate. $3x + 5 + 2x - 8 = (3 + 2)x + (5 - 8) = 5x - 3$. The terms $x$ and $x^2$ are not like terms.

**Worked example**

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

**1.** Variable terms: $(7 + (4))x = 11x$.
**2.** Constants: $9 + (-3) = 6$.
**3.** Together: $11x + 6$.
**Answer:** $11x + 6$.

## Practice Problems

Show your thinking.

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

**2.** Recover coefficients: an equivalent form of $3x + (2)x + (-2) + (5)$ 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 $4x + (-1)x + (5) + (3)$ when $x = 2$. Verify by rewriting first; report any error.

**4.** Rebuild the form: $5x + (3)x + (2) + (-2) = 8x + k$. Find $k$, then write the simplified expression.

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

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

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

**8.** Token-count rule: an equivalent form of $-4x + (9)x + (6) + (-2)$ 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 $5x + (-2)x + (-8) + (3)$ when $x = 2$. Verify by rewriting first; report any error.

**10.** Meter-offset rule: $8x + (-5)x + (1) + (-7) = 3x + k$. Find $k$, then write the simplified expression.

# Answer Key

1. Correct form $5x + 8$; correct value $18$, not $19$.
2. $(q, r) = (5, 3)$; $5x + 3$.
3. No error; $3x + 8$ evaluates to $14$.
4. $k = 0$; $8x$.
5. Yes; they are equivalent.
6. $7x + 3$; value $17$.
7. Correct form $4x + 4$; correct value $12$, not $13$.
8. $(q, r) = (5, 4)$; $5x + 4$.
9. No error; $3x - 5$ evaluates to $1$.
10. $k = -6$; $3x - 6$.

## Step-by-Step Solutions

Follow each calculation, then check your own work.

### Problem 1

1. Variable terms: $(2 + (3))x = 5x$.
2. Constants: $3 + (5) = 8$.
3. Together: $5x + 8$.
4. At $x = 2$, the correct value is $5(2) + (8) = 18$; the claim gives $19$.

### Problem 2

1. Variable terms: $(3 + (2))x = 5x$.
2. Constants: $-2 + (5) = 3$.
3. Together: $5x + 3$.

### Problem 3

1. Variable terms: $(4 + (-1))x = 3x$.
2. Constants: $5 + (3) = 8$.
3. Together: $3x + 8$.
4. Check: $3(2) + (8) = 14$.

### Problem 4

1. Variable terms: $(5 + (3))x = 8x$.
2. Constants: $2 + (-2) = 0$.
3. Together: $8x$.
4. The variable terms match, so the missing constant is $k = 0$.

### Problem 5

1. Variable terms: $(2 + (5))x = 7x$.
2. Constants: $7 + (3) = 10$.
3. Together: $7x + 10$.
4. Numerical check at $x = 2$: both equal $7(2) + (10) = 24$.

### Problem 6

1. Variable terms: $(3 + (4))x = 7x$.
2. Constants: $4 + (-1) = 3$.
3. Together: $7x + 3$.
4. At $x = 2$: $7(2) + (3) = 17$.

### Problem 7

1. Variable terms: $(7 + (-3))x = 4x$.
2. Constants: $-5 + (9) = 4$.
3. Together: $4x + 4$.
4. At $x = 2$, the correct value is $4(2) + (4) = 12$; the claim gives $13$.

### Problem 8

1. Variable terms: $(-4 + (9))x = 5x$.
2. Constants: $6 + (-2) = 4$.
3. Together: $5x + 4$.

### Problem 9

1. Variable terms: $(5 + (-2))x = 3x$.
2. Constants: $-8 + (3) = -5$.
3. Together: $3x - 5$.
4. Check: $3(2) + (-5) = 1$.

### Problem 10

1. Variable terms: $(8 + (-5))x = 3x$.
2. Constants: $1 + (-7) = -6$.
3. Together: $3x - 6$.
4. The variable terms match, so the missing constant is $k = -6$.

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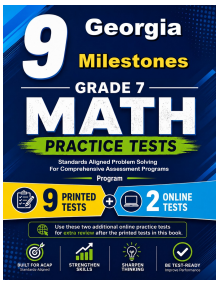


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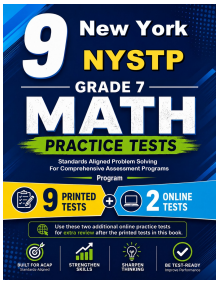


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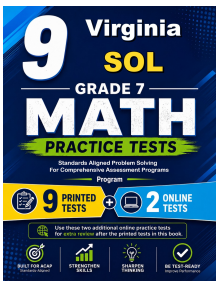


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