Simplifying Expressions by Combining Like Terms

Explore ideas and representations

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. Algebra tiles: simplify $2x + (3)x + (3) + (5)$.

2. Substitution table: rewrite $3x + (2)x + (-2) + (5)$, then evaluate the rewritten expression at $x = 2$.

3. Missing constant: $4x + (-1)x + (5) + (3) = 3x + k$. Find k, then write the simplified expression.

4. Identity test: decide whether $5x + (3)x + (2) + (-2)$ and $8x$ are equivalent for every x. Give algebra and a numerical check.

5. Check a claim: a student claims $2x + (5)x + (7) + (3) = 7x + 11$. Correct the constant term and verify at $x = 2$.

6. Workshop cost: a cost in dollars is modeled by $3x + (4)x + (4) + (-1)$. Rewrite it to expose its coefficient and fixed amount, then find the cost at $x = 2$.

7. Locker-code rule: simplify $7x + (-3)x + (-5) + (9)$.

8. Token-count rule: rewrite $-4x + (9)x + (6) + (-2)$, then evaluate the rewritten expression at $x = 2$.

9. Tile-pack rule: $5x + (-2)x + (-8) + (3) = 3x + k$. Find k, then write the simplified expression.

10. Meter-offset rule: decide whether $8x + (-5)x + (1) + (-7)$ and $3x - 6$ are equivalent for every x. Give algebra and a numerical check.

Answer Key

1. $5x + 8$.
2. $5x + 3$; value 13.
3. $k = 8$; $3x + 8$.
4. Yes; they are equivalent.
5. Correct form $7x + 10$; correct value 24, not 25.
6. $7x + 3$; cost $17.00.
7. $4x + 4$.
8. $5x + 4$; value 14.
9. $k = -5$; $3x - 5$.
10. Yes; they are equivalent.

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: $5x + 8$.

Problem 2

1. Variable terms: $(3 + (2))x = 5x$.
2. Constants: $-2 + (5) = 3$.
3. Together: $5x + 3$.
4. At $x = 2$: $5(2) + (3) = 13$.

Problem 3

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

Problem 4

1. Variable terms: $(5 + (3))x = 8x$.
2. Constants: $2 + (-2) = 0$.
3. Together: $8x$.
4. Numerical check at $x = 2$: both equal $8(2) + (0) = 16$.

Problem 5

1. Variable terms: $(2 + (5))x = 7x$.
2. Constants: $7 + (3) = 10$.
3. Together: $7x + 10$.
4. At $x = 2$, the correct value is $7(2) + (10) = 24$; the claim gives 25.

Problem 6

1. Variable terms: $(3 + (4))x = 7x$.
2. Constants: $4 + (-1) = 3$.
3. Together: $7x + 3$.
4. The cost at $x = 2$ is $7(2) + (3) = 17$ dollars.

Problem 7

1. Variable terms: $(7 + (-3))x = 4x$.
2. Constants: $-5 + (9) = 4$.
3. Together: $4x + 4$.

Problem 8

1. Variable terms: $(-4 + (9))x = 5x$.
2. Constants: $6 + (-2) = 4$.
3. Together: $5x + 4$.
4. At $x = 2$: $5(2) + (4) = 14$.

Problem 9

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

Problem 10

1. Variable terms: $(8 + (-5))x = 3x$.
2. Constants: $1 + (-7) = -6$.
3. Together: $3x - 6$.
4. Numerical check at $x = 2$: both equal $3(2) + (-6) = 0$.

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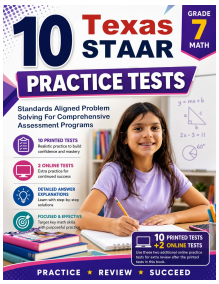

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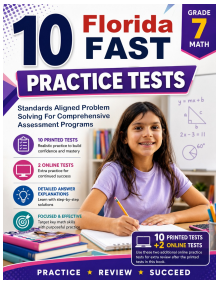

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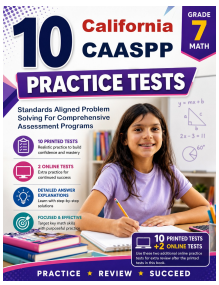

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