Equivalent Expressions

Equivalent expressions: Mistakes and missing information

Name _____ **Date** _____ **Score** _____ / 8

QUICK REVIEW

Equivalent expressions have the same value for every allowed input. Distribute $3(x+4) = 3x+12$ and combine like terms $2x+5x = 7x$. Unlike terms such as $2x+5$ cannot be combined into $7x$. Testing inputs can expose an error; the distributive property explains equality for all inputs.

Worked example

Expand and check at two inputs. Use $3(x+4)$.

1. Distribute: $3(x+4) = 3x+3\times 4 = 3x+12$.
2. At $x=2$, original $3((2)+4) = 18$ and rewritten $3(2)+12 = 18$.
3. At $x=5$, original $3((5)+4) = 27$ and rewritten $3(5)+12 = 27$.
Answer: $3x+12$.

Practice Problems

Show your thinking.

1. Correct the student expansion $5x+4$. Use $5(x+4)$.

2. A student adds unlike constant and variable terms into one coefficient. Correct it. Use $3x+6x+2$.

3. Find the simplified form hidden by parentheses. Use $2(x+5)+3x$.

4. A student forgets to multiply the constant. Repair it. Use $4(x+7)$.

5. Recover the combined coefficient and unchanged constant. Use $5x+2x+9$.

6. Explain using distribution and a numerical check. Use $3(x+4)+2x$.

7. A student forgets one of the variable terms. Correct the simplified form. Use $2(x+9)+4x$.

8. Recover the combined coefficient and show that the constant stays separate. Use $8x+2x+3$.

Answer Key

1. $5x + 20$.
2. $9x + 2$.
3. $5x + 10$.
4. $4x + 28$.
5. $7x + 9$.
6. $5x + 12$.
7. $6x + 18$.
8. $10x + 3$.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. Distribute: $5(x + 4) = 5x + 5 \times 4 = 5x + 20$.
2. At $x = 2$, original $5((2) + 4) = 30$ and rewritten $5(2) + 20 = 30$.
3. At $x = 5$, original $5((5) + 4) = 45$ and rewritten $5(5) + 20 = 45$.

Problem 2

1. Combine the variable coefficients: $(3 + 6)x + 2 = 9x + 2$.
2. At $x = 2$, original $3(2) + 6(2) + 2 = 20$ and rewritten $9(2) + 2 = 20$.
3. At $x = 5$, original $3(5) + 6(5) + 2 = 47$ and rewritten $9(5) + 2 = 47$.

Problem 3

1. Distribute, then combine: $2x + 10 + 3x = 5x + 10$.
2. At $x = 2$, original $2((2) + 5) + 3(2) = 20$ and rewritten $5(2) + 10 = 20$.
3. At $x = 5$, original $2((5) + 5) + 3(5) = 35$ and rewritten $5(5) + 10 = 35$.

Problem 4

1. Distribute: $4(x + 7) = 4x + 4 \times 7 = 4x + 28$.
2. At $x = 2$, original $4((2) + 7) = 36$ and rewritten $4(2) + 28 = 36$.
3. At $x = 5$, original $4((5) + 7) = 48$ and rewritten $4(5) + 28 = 48$.

Problem 5

1. Combine the variable coefficients: $(5 + 2)x + 9 = 7x + 9$.
2. At $x = 2$, original $5(2) + 2(2) + 9 = 23$ and rewritten $7(2) + 9 = 23$.
3. At $x = 5$, original $5(5) + 2(5) + 9 = 44$ and rewritten $7(5) + 9 = 44$.

Problem 6

1. Distribute, then combine: $3x + 12 + 2x = 5x + 12$.
2. At $x = 2$, original $3((2) + 4) + 2(2) = 22$ and rewritten $5(2) + 12 = 22$.
3. At $x = 5$, original $3((5) + 4) + 2(5) = 37$ and rewritten $5(5) + 12 = 37$.

Problem 7

1. Distribute, then combine: $2x + 18 + 4x = 6x + 18$.
2. At $x = 2$, original $2((2) + 9) + 4(2) = 30$ and rewritten $6(2) + 18 = 30$.
3. At $x = 5$, original $2((5) + 9) + 4(5) = 48$ and rewritten $6(5) + 18 = 48$.

Problem 8

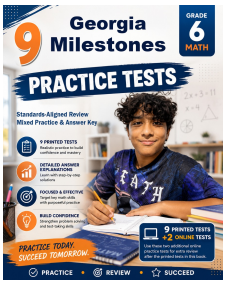
1. Combine the variable coefficients: $(8 + 2)x + 3 = 10x + 3$.
2. At $x = 2$, original $8(2) + 2(2) + 3 = 23$ and rewritten $10(2) + 3 = 23$.
3. At $x = 5$, original $8(5) + 2(5) + 3 = 53$ and rewritten $10(5) + 3 = 53$.

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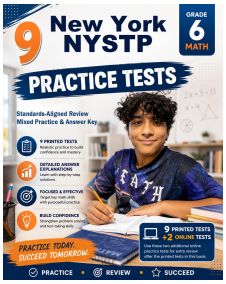
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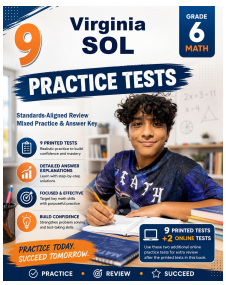
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