Year 9 Algebraic Expressions – Challenge

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Answers and worked solutions · 8 questions

A. Think like a mathematician

1. Yes. 3x + 6 = 3(x + 2), and the factor 3 cancels: x + 2.

Test some values, or expand and simplify
3x + 6 = 3(x + 2), and the factor 3 cancels: x + 2.
Decide

2. No. Only whole factors cancel: (x + 4)/4 = x/4 + 1. For x = 4: 8/4 = 2, not 5.

Test some values, or expand and simplify
Only whole factors cancel: (x + 4)/4 = x/4 + 1. For x = 4: 8/4 = 2, not 5.
Decide

3. Mistake: the square of a bracket is not the square of each term. Correct: $x^2 + 18x + 81$

Error: the square of a bracket is not the square of each term
$(x + 9)^2 = (x + 9)(x + 9)$
$= x^2 + 18x + 81$

4. Mistake: the two middle terms are missing. Correct: $x^2 - 2x - 48$

Error: the two middle terms are missing
$x^2 - 8x + 6x - 48$
$= x^2 - 2x - 48$

5. −4, −4, −4: the answer is always −4. $n \times (n + 4) - (n + 2)^2 = -4$.

$3 \times 7 - 5^2 = -4$, $6 \times 10 - 8^2 = -4$, $13 \times 17 - 15^2 = -4$
Expand and simplify $n \times (n + 4) - (n + 2)^2$
$= -4$

6. Expand both parts and subtract: the result is 81.

$(x + 9)^2 = x^2 + 18x + 81$
$x(x + 18) = x^2 + 18x$
Subtract: 81

7. $x^2 + 2x$ cm^2

Area = ½ × base × height
= ½ × 2x × (x + 2) = x(x + 2)
$= x^2 + 2x$ cm^2

8. a/5

Factorise both: a(a − 9) and 5(a − 9)
Cancel (a − 9): a/5