

WA8MNAA2

Algebraic techniques

Core + Challenge

Simplifying Algebraic Expressions

I can collect like terms, including negative terms and several pronumerals, and check equivalence by substituting.

Name: _____ Date: _____ Score: _____ / 58

Key idea

Like terms have the same pronumerals with the same powers: $3ab$ and $-5ba$ are like; $4x$ and $4x^2$ are **not**.

Collect like terms by adding coefficients; a sign belongs to the term after it. $7a - 3b - 2a + 5b = 5a + 2b$

Commutative and associative laws: add terms in any order or grouping. $4x + 9 - x = 3x + 9 = 9 + 3x$

Check by substituting: with $a = 2$, $b = 3$: $7(2) - 3(3) - 2(2) + 5(3) = 16$ and $5(2) + 2(3) = 16$ ✓

A

Fluency *practise the skill*

/ 16 marks

Simplify each expression (Q15–16: evaluate). 1 mark each.

1. $5x + 3x$ _____

9. $4x^2 + 3x - x^2 + 2x$ _____

2. $9a - 4a$ _____

10. $7mn - 2m + 3nm$ _____

3. $3m - 7m$ _____

11. $k - 6k + 2k$ _____

4. $6y + 2 + 3y$ _____

12. $2.5c + 1.5c$ _____

5. $4a + 3b + 2a + b$ _____

13. $6 - 4t + 2t - 10$ _____

6. $8p - 3q - 5p + q$ _____

14. $5xy - 3x + 2yx + 3x$ _____

7. $-2x + 7 - 5x - 9$ _____

15. $3a + 2b$ when $a = 4$, $b = -1$ _____

8. $3ab + 5ba$ _____

16. $2x^2 - x$ when $x = -3$ _____

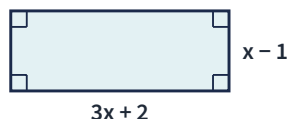
B

Core *apply the skill to problems*

/ 22 marks

- 1 Find a simplified expression for the perimeter of this rectangle.

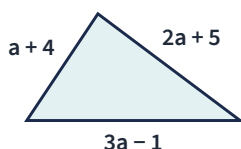
[2 marks]



Answer: _____

- 2 Find a simplified expression for the perimeter of this triangle.

[2 marks]



Answer: _____

- 3 In a netball game, Ruby scored $4x$ goals in the first half and $2x - 3$ goals in the second half. Jess scored $5x + 1$ goals in the whole game. Write a simplified expression for their combined total.

[2 marks]

Answer: _____

- 4 Simplify $5a - 3b + 2c - a + 7b - 4c$

[2 marks]

Answer: _____

- 5 Simplify $3x^2 - 4x + 5 - x^2 + 6x - 8$

[2 marks]

Answer: _____

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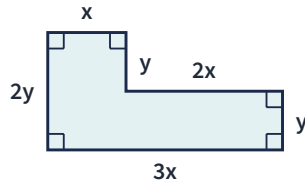
- 6 At Woolies, apples cost a cents each and bananas cost b cents each. Kim buys 6 apples and 4 bananas; Lee buys 3 apples and 5 bananas. Write simplified expressions for (a) the total the two spend, and (b) how much more Kim spends than Lee. [3 marks]

.....

.....

Answer: _____

- 7 Find a simplified expression for the perimeter of this L-shape. [2 marks]



.....

Answer: _____

- 8 Find the missing term in each: (a) $4x - 3y + \square = x - 3y$ (b) $5m + \square - 2n = 5m + 4n$ [2 marks]

.....

Answer: _____

- 9 Which two of these expressions are equivalent? A: $2a + 3b - a + b$ B: $4ab + a$ C: $5a - 4a + 2b + 2b$ D: $4a + b$. Check by substituting $a = 3$ and $b = 2$. [2 marks]

.....

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Answer: _____

- 10 A regular hexagon has sides of $(2k - 1)$ cm and a square has sides of $(3k + 2)$ cm. Show that the square's perimeter is always 14 cm more than the hexagon's. [3 marks]

.....

.....

Answer: _____

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C**Reasoning** *explain, justify and check*

/ 9 marks

- 1 Ella simplified $5x - 2y - 3x + 4y$ and got $2x - 6y$. Explain her mistake and give the correct answer. [2 marks]

- 2 Explain why $3a + 2b$ cannot be simplified to $5ab$. Use $a = 2$ and $b = 3$ to support your answer. [2 marks]

- 3 True or false: $4x^2 + 3x = 7x^3$. Give a reason. [2 marks]

- 4 Explain why one substitution can show two expressions are NOT equivalent, but can never prove that they ARE. Use x^2 and $2x$ as an example. [3 marks]

D**Challenge** *multi-step and problem-solving*

/ 11 marks

- 1 A rectangle has perimeter $(10a + 6b)$ cm and length $(3a + b)$ cm. Find its width. [2 marks]

Answer: _____

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- 2 In this magic square, every row, column and diagonal has the same total. Fill in the five empty cells and find the magic total. [3 marks]

$x + 3$	$x - 4$	
	x	
$x - 1$		

.....

 Answer: _____

- 3 An isosceles triangle has two equal sides of $(3n + 2)$ cm and a perimeter of $(10n + 1)$ cm. Find an expression for the base. If the base is 11 cm, find n . [3 marks]

.....

 Answer: _____

- 4 Write and simplify an expression for the sum of four consecutive whole numbers, starting with n . Explain why this sum can never be a multiple of 4. [3 marks]

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 Answer: _____

How did I go?

Fluency ___ / 16 Core ___ / 22 Reasoning ___ / 9 Challenge ___ / 11 **Total** ___ / 58

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