

WA7MNAA4

Algebraic techniques

Core + Challenge

Substitution — Marking Key

I can substitute values into algebraic expressions and everyday formulas, using the correct order of operations.

For tutors and parents. Award method marks for correct working even if the final answer is wrong.

Marks summary

Section A Fluency: 16 Section B Core: 21 Section C Reasoning: 9 Section D Challenge: 9 **Total: 55**

Fluency: 1 mark each; accept an equivalent unsimplified answer for half credit at tutor's discretion.

A Fluency *answers and working*

/ 16 marks

Q	Answer	Working
1	8	$3 + 5 = 8$
2	12	$4 \times 3 = 12$
3	15	$3 \times 5 = 15$
4	3	$5 - 2 = 3$
5	12	$2 \times 3 + 3 \times 2 = 12$
6	9	$3^2 = 9$
7	4	$(3 + 5) \div 2 = 4$
8	6	$3 \times (5 - 3) = 6$
9	30	$3 \times 5 \times 2 = 30$
10	16	$5^2 - 3^2 = 16$
11	6	$10 - 2 \times 2 = 6$
12	9	$6 \times 3 \div 2 = 9$
13	13	$3 + 5 \times 2 = 13$
14	16	$(3 + 5) \times 2 = 16$
15	18	$2 \times 3^2 = 18$
16	7	$5 \times 2 - 3 = 7$

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B

Core answers, working and marks

/ 21 marks

Q	Answer	Working / sample response	Marks
1	Yes – exactly 115 cm	$56 + 36 + 23 = 115$ 1 mark: 115 1 mark: yes	2
2	\$29	$4 + 2 \times 12.5 = 4 + 25 = 29$ 1 mark: substitution 1 mark: \$29	2
3	23 cm	$15 + 8 = 23$ 1 mark: substitution 1 mark: 23 cm	2
4	77 °F	$1.8 \times 25 + 32 = 45 + 32 = 77$ 1 mark: 45 1 mark: 77 °F	2
5	207 beats per minute	$220 - 13 = 207$ 1 mark each	2
6	42 cm ²	$12 \times 7 \div 2 = 42$ 1 mark: substitution 1 mark: 42 cm ²	2
7	\$93	$48 + 45 = 93$ 1 mark: substitution 1 mark: \$93	2
8	\$43	$25 + 18 = 43$ 1 mark: 18 1 mark: \$43	2
9	30 m ³	$2.5 \times 4 \times 3 = 30$ 1 mark: substitution 1 mark: 30 m ³	2
10	(a) 60 km/h (b) 60 km/h (c) the same speed	$150 \div 2.5 = 60$; $90 \div 1.5 = 60$ 1 mark each part	3

C

Reasoning sample answers and marking criteria

/ 9 marks

Q	Answer	Working / sample response	Marks
1	$3a = 3 \times a$	The number and letter are multiplied: $3 \times 4 = 12$. 2 marks	2
2	12 and 36	$3x^2$: square first then $\times 3 = 12$. $(3x)^2$: brackets first = 6, then square = 36. 1 mark each value 1 mark: order of operations	3

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Q	Answer	Working / sample response	Marks
3	$2n = 10$	$2n$ means $2 \times n = 10$. He wrote 2 and 5 side by side. <i>1 mark: explanation</i> <i>1 mark: 10</i>	2
4	$x = 2$ (or $x = 0$)	$2 \times 2 = 4$ and $2^2 = 4$. Test values in a table. <i>1 mark: value</i> <i>1 mark: method</i>	2

D

Challenge *solutions and marking criteria*

/ 9 marks

Q	Answer	Working / sample response	Marks
1	19	$q = 8 - 3 = 5$; $3 \times 5 + 4 = 19$ <i>1 mark: $q = 5$</i> <i>1 mark: 19</i>	2
2	7	$x = 6 \rightarrow 27$; $x = 7 \rightarrow 32 \checkmark$ <i>1 mark: trials</i> <i>1 mark: 7</i>	2
3	$1681 = 41 \times 41$	$40^2 + 40 + 41 = 1600 + 81 = 1681 = 41^2$, so it is not prime. <i>1 mark: 1681</i> <i>1 mark: 41×41</i> <i>1 mark: conclusion</i>	3
4	$\frac{1}{a} = 2$	0.25, 1, 2, 0.25 <i>1 mark: values</i> <i>1 mark: $\frac{1}{a}$</i>	2