

WA8MNAA2

Algebraic techniques

Core + Challenge

Multiplying and Dividing Algebraic Terms — Marking Key

I can multiply and divide algebraic terms with coefficients and signs, and use the order of operations to simplify.

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: 22 Section C Reasoning: 9 Section D Challenge: 11 **Total: 58**

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	12a	$4 \times 3 = 12$
2	10xy	$5 \times 2; x \times y$
3	12m ²	$m \times m = m^2$
4	-12ab	different signs: negative
5	21pq	same signs: positive
6	24abc	$2 \times 3 \times 4 = 24$
7	10x ² y	$x \times x = x^2$
8	5k	$20 \div 4 = 5$
9	3a	$\frac{12ab}{4b} = 3a$
10	-3n	$\frac{-18mn}{6m} = -3n$
11	3x	$24 \div 8 = 3; x^2 \div x = x$
12	3p	$15 \div 5 = 3; q \text{ cancels}$
13	7a ²	same signs: positive
14	14a	$12a + 2a$
15	4y	$6y - 2y$
16	-4a	$36 \div (-9) = -4; a^2b \div ab = a$

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B

Core *answers, working and marks*

/ 22 marks

Q	Answer	Working / sample response	Marks
1	$15xy \text{ cm}^2$	$5x \times 3y = 15xy$ <i>1 mark: 15</i> <i>1 mark: xy</i>	2
2	$12ab \text{ cm}^2$	$\frac{1}{2} \times 6a \times 4b$ $= 12ab$ <i>1 mark: formula</i> <i>1 mark: 12ab</i>	2
3	$6m \text{ cm}$	$24mn \div 4n$ $= 6m$ <i>1 mark: division</i> <i>1 mark: 6m</i>	2
4	$\$6ab$	$3a \times 2b = 6ab$ <i>1 mark: multiplication</i> <i>1 mark: 6ab</i>	2
5	$2b$	$4a \times 3b = 12ab$ $12ab \div 6a = 2b$ <i>1 mark: 12ab</i> <i>1 mark: 2b</i>	2
6	$7xy$	$\times \text{ first: } 10xy$ $10xy - 3xy = 7xy$ <i>1 mark: 10xy</i> <i>1 mark: 7xy</i>	2
7	$-8mn$	$-3m \times 4n = -12mn$; $20mn \div 5 = 4mn$ $-12mn + 4mn = -8mn$ <i>1 mark: both products</i> <i>1 mark: -8mn</i>	2
8	$11x^2 \text{ cm}^2$	Rectangle: $4x \times 3x = 12x^2$ Square: $x \times x = x^2$ $12x^2 - x^2 = 11x^2$ <i>1 mark: 12x²</i> <i>1 mark: x²</i> <i>1 mark: 11x²</i>	3
9	$30a^2b \text{ cm}^3$	$2a \times 3a \times 5b$ $= 30a^2b$ <i>1 mark: 30</i> <i>1 mark: a²b</i>	2
10	$\$6q$	$36pq \div 9p = 4q$ $4q + 2q = 6q$ <i>1 mark: division</i> <i>1 mark: 4q</i> <i>1 mark: 6q</i>	3

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C Reasoning *sample answers and marking criteria*

/ 9 marks

Q	Answer	Working / sample response	Marks
1	$12a^2$	He forgot that $a \times a = a^2$. The pronumerals must be multiplied as well as the numbers. <i>1 mark: explains error</i> <i>1 mark: $12a^2$</i>	2
2	$6xy$	Multiplying two negatives gives a positive: $-2 \times (-3) = 6$. $-2x \times (-3y) = 6xy$ <i>1 mark: sign reason</i> <i>1 mark: $6xy$</i>	2
3	False; it equals 3	$\frac{12x}{4x}$: the x cancels, leaving 3. Check $x = 2$: $24 \div 8 = 3$, not $3 \times 2 = 6$. <i>1 mark: false</i> <i>1 mark: reason</i>	2
4	$6 + 8a$	Multiply first: $2a \times 4 = 8a$, then $6 + 8a$ (unlike terms, so it stops there). $a = 1$: $6 + 2 \times 4 = 14 = 6 + 8(1)$, but $32a = 32$. <i>1 mark: order of operations</i> <i>1 mark: $6 + 8a$</i> <i>1 mark: check</i>	3

D Challenge *solutions and marking criteria*

/ 11 marks

Q	Answer	Working / sample response	Marks
1	Width $3x$ cm; perimeter $(12xy + 6x)$ cm	$18x^2y \div 6xy = 3x$ $P = 2 \times 6xy + 2 \times 3x$ $= 12xy + 6x$ <i>1 mark: $3x$</i> <i>1 mark: perimeter set-up</i> <i>1 mark: $12xy + 6x$</i>	3
2	$2ab$	$-2a \times 3ab \times (-4b) = 24a^2b^2$ $24a^2b^2 \div 12ab = 2ab$ <i>1 mark: $24a^2b^2$</i> <i>1 mark: $2ab$</i>	2
3	(a) $-4m$ (b) $-6xy$	(a) $12m^2n \div (-3mn) = -4m$ (b) $30x^2y \div (-5x) = -6xy$ Check signs: $-4m \times (-3mn) = 12m^2n$ <i>1 mark: (a)</i> <i>1 mark: (b) value</i> <i>1 mark: (b) sign</i>	3

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Q	Answer	Working / sample response	Marks
4	$6a^3 \text{ cm}^3$	Cube: $2a \times 2a \times 2a = 8a^3$ Hole: $a \times a \times 2a = 2a^3$ $8a^3 - 2a^3 = 6a^3$ <i>1 mark: $8a^3$</i> <i>1 mark: $2a^3$</i> <i>1 mark: $6a^3$</i>	3