

WA8MNAUN3

Understanding number

Core + Challenge

Multiplying and Dividing Integers — Marking Key

I can multiply and divide positive and negative integers, explain the sign rules and use them with powers and in contexts.

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	-42	different signs → negative
2	40	same signs → positive
3	-36	different signs
4	-8	different signs
5	8	same signs
6	-7	different signs
7	36	same signs
8	-1	three negatives (odd) → negative
9	9	-3×-3
10	-8	$-2 \times -2 \times -2$
11	-9	only the 3 is squared: $-(3 \times 3)$
12	1	even power → positive
13	30	two negatives → positive
14	25	same signs
15	$n = -6$	$42 \div -7 = -6$
16	$n = -9$	$-72 \div 8 = -9$

Multiplying and Dividing Integers · WA8MNAUN3

B

Core answers, working and marks

/ 22 marks

Q	Answer	Working / sample response	Marks
1	-8, -4, 0, 4, 8	The answers increase by 4 each time continuing the pattern past 0 gives positive answers: $-1 \times -4 = 4$, $-2 \times -4 = 8$ <i>1 mark: table complete</i> <i>1 mark: pattern explanation</i>	2
2	$5 \times -3 = -15$; -11°C	change: $5 \times -3 = -15^\circ\text{C}$ $4 + (-15) = -11^\circ\text{C}$ <i>1 mark: $5 \times -3 = -15$</i> <i>1 mark: -11°C</i>	2
3	$-84 \div 4 = -21$: each owes \$21	$-84 \div 4 = -21$ <i>1 mark: $-84 \div 4$</i> <i>1 mark: -21</i>	2
4	$-12 \times -3 = 36$: 36 m higher	3 minutes ago: time = -3 $-12 \times -3 = +36$, so 36 m higher (shallower) than now <i>1 mark: -12×-3</i> <i>1 mark: 36 m higher</i>	2
5	(a) -24 (b) -25	(a) three negatives $\rightarrow$ negative: -24 (b) $-1 \times 25 = -25$ <i>1 mark each</i>	2
6	Row -3: 6, -18, 21; Row 4: -8, 24, -28; Row -5: 10, -30, 35	each cell = row number $\times$ column number same signs positive, different signs negative <i>3 marks: all 9 correct</i> <i>2 marks: 7-8 correct</i> <i>1 mark: 5-6 correct</i>	3
7	(a) -\$21 600 (b) -\$1 200 per month	(a) $12 \times -1\,800 = -21\,600$ (b) $-7\,200 \div 6 = -1\,200$ <i>1 mark each</i>	2
8	-7, 54, -6	$56 \div -8 = -7$ $-9 \times -6 = 54$ $-90 \div 15 = -6$ <i>1 mark each</i>	3
9	9 and -4	different signs (product negative): try $9 \times -4 = -36$ $9 + (-4) = 5$ <i>1 mark: product</i> <i>1 mark: both conditions</i>	2
10	-3°C	sum: $-4 + (-7) + 2 + (-3) = -12$ $-12 \div 4 = -3$ <i>1 mark: sum -12</i> <i>1 mark: -3°C</i>	2

Multiplying and Dividing Integers · WA8MNAUN3

C Reasoning *sample answers and marking criteria*

/ 9 marks

Q	Answer	Working / sample response	Marks
1	-3×-4 must be +12	$-3 \times (4 + (-4)) = -3 \times 0 = 0$ expanding: $-3 \times 4 + (-3 \times -4) = -12 + (-3 \times -4) = 0$ so $-3 \times -4 = 12$ (the number that adds to -12 to make 0) <i>1 mark: sets up $-3 \times (4 + -4) = 0$</i> <i>1 mark: expands</i> <i>1 mark: conclusion</i>	3
2	$-2^4 = -16$; $(-2)^4 = 16$	The power applies only to the 2: $-(2 \times 2 \times 2 \times 2) = -16$ Brackets are needed: $(-2)^4 = 16$ <i>1 mark: -16 with reason</i> <i>1 mark: $(-2)^4$</i>	2
3	True	Pairs of negatives multiply to positive: 12 pairs give + one negative is left over, so the product is negative (odd number of negatives) <i>1 mark: true</i> <i>1 mark: reason</i>	2
4	$-30 \div -5 = 6$	Division is the inverse of multiplication: $6 \times -5 = -30$ so $-30 \div -5 = 6$, which is positive <i>1 mark: $6 \times -5 = -30$</i> <i>1 mark: conclusion</i>	2

D Challenge *solutions and marking criteria*

/ 11 marks

Q	Answer	Working / sample response	Marks
1	90	10 negatives (even) $\rightarrow$ positive: $1 \times 2 \times \dots \times 10$ cancel $1 \times 2 \times \dots \times 8$, leaving $9 \times 10 = 90$ <i>1 mark: positive sign</i> <i>1 mark: 90</i>	2
2	$\{-5, 2, 3\}$ and $\{-6, 1, 5\}$	product negative: one or three of them negative; sum 0 means exactly one negative the negative one equals minus the sum of the two positives try positive pairs: $2 + 3 = 5$ and $2 \times 3 \times -5 = -30 \checkmark$; $1 + 5 = 6$ and $1 \times 5 \times -6 = -30$ $\checkmark$ <i>1 mark: one negative</i> <i>1 mark each set</i>	3
3	(a) -1 (b) -1	(a) the terms go $-1, +1, -1, \dots$: 49 pairs make 0, and $(-1)^{99} = -1$ is left (b) odd powers of -1 are -1 , even powers are 1: five odd powers (1, 3, 5, 7, 9) $\rightarrow (-1)^5 = -1$ <i>1 mark: pairing</i> <i>1 mark: (a) -1</i> <i>1 mark: (b) -1</i>	3

Multiplying and Dividing Integers · WA8MNAUN3

Q	Answer	Working / sample response	Marks
4	7 wrong	If c correct: $5c + (-2)(20 - c) = 51$ $7c - 40 = 51$, so $c = 13$ $20 - 13 = 7$ wrong. Check: $65 - 14 = 51$ ✓ <i>1 mark: equation or systematic trial</i> <i>1 mark: 13 correct</i> <i>1 mark: 7 wrong</i>	3