

WA8MNALP1

Linear and non-linear patterns and relationships

Core + Challenge

Graphing Linear Relationships — Marking Key

I can use a table of values to graph $y = mx + c$, read points from a line and test whether a point lies on a line.

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	$y = 10$	$3 \times 4 - 2$
2	$y = -5$	$-3 - 2$
3	$y = -1$	$-6 + 5$
4	$y = 9$	$4 + 5$
5	$y = 1$	$-3 + 4$
6	$y = 8$	$5 + 3$
7	yes	$3 \times 2 + 1 = 7 \checkmark$
8	no	$2 + 3 = 5 \neq 4$
9	$x = 4$	$2x = 8$
10	$y = 5$	read from graph ($2 \times 2 + 1$)
11	$x = -2$	read from graph
12	$y = 5$	read from graph
13	(4, 0)	$y = 0$ when $x = 4$
14	(0, 1)	$x = 0$ gives $y = 1$
15	(1, 3)	on both lines
16	down	y decreases as x increases

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B

Core answers, working and marks

/ 22 marks

Q	Answer	Working / sample response	Marks
1	y: -5, -3, -1, 1, 3; straight line	$2(-1) - 3 = -5$, $2(0) - 3 = -3$, -1, 1, 3 Plot (-1, -5), (0, -3), (1, -1), (2, 1), (3, 3) and rule a line <i>1 mark: 3 correct values</i> <i>1 mark: all 5 values</i> <i>1 mark: points plotted and joined</i>	3
2	y: 8, 5, 2, -1, -4	$-3(-2) + 2 = 8$, $-3(-1) + 2 = 5$, 2, -1, -4 <i>1 mark: 3 correct</i> <i>1 mark: all correct</i>	2
3	(a) y = 5 (b) x = -2	(a) $2(3) - 1 = 5$ (b) $2x - 1 = -5 \rightarrow x = -2$ <i>1 mark each</i>	2
4	(2, 1) and (-1, -8)	$3(2) - 5 = 1 \checkmark$ $3(-1) - 5 = -8 \checkmark$ $3(4) - 5 = 7 \neq 6 \times$ <i>1 mark: working</i> <i>1 mark: correct pair</i>	2
5	k = 3	$4k - 1 = 11 \rightarrow 4k = 12 \rightarrow k = 3$ <i>1 mark: equation</i> <i>1 mark: k = 3</i>	2
6	C: 60, 100, 140, 180, 220; constant increase	$40(0) + 60 = 60$, then add 40 each hour C rises by the same amount (\$40) for each extra hour, so the points lie on a straight line <i>1 mark: 3 values</i> <i>1 mark: all values</i> <i>1 mark: explanation</i>	3
7	6 °C; after 6 hours	$T = 18 - 12 = 6$ $18 - 3h = 0 \rightarrow h = 6$ <i>1 mark each</i>	2
8	P: y = x + 1; Q: y = -x + 1	P goes up (positive gradient): e.g. (2, 3) is on P and $2 + 1 = 3$ Q goes down: (2, -1) is on Q and $-2 + 1 = -1$ <i>1 mark: correct match</i> <i>1 mark: reason</i>	2
9	Yes	$-(-4) \div 2 + 3 = 2 + 3 = 5 \checkmark$ <i>1 mark: substitution</i> <i>1 mark: yes</i>	2
10	No	Differences: 2, 4, 6, 8: not constant A linear relationship changes by the same amount each step <i>1 mark: differences</i> <i>1 mark: not linear</i>	2

C Reasoning *sample answers and marking criteria*

/ 9 marks

Q	Answer	Working / sample response	Marks
1	y always increases by 2	Each time x goes up by 1, y goes up by exactly 2, so every step is the same: a straight line. <i>1 mark: constant change</i> <i>1 mark: straight line</i>	2
2	y = 7	He used $-2 \times -2 = -4$; it should be +4. $-2(-2) + 3 = 4 + 3 = 7$ <i>1 mark: error</i> <i>1 mark: y = 7</i>	2
3	The third point checks for mistakes	Two points always make a line; a third point that lines up confirms no calculation or plotting error. <i>1 mark: two points always make a line</i> <i>1 mark: a third point checks for errors</i>	2
4	True	Substitute $x = 0$: $y = m \times 0 + c = c$ So (0, c) satisfies the rule for any m It is where the line crosses the y-axis <i>1 mark: true</i> <i>1 mark: substitution</i> <i>1 mark: y-axis</i>	3

D Challenge *solutions and marking criteria*

/ 11 marks

Q	Answer	Working / sample response	Marks
1	$y = 3x + 2$; $a = 6$	x up 2, y up 6: y increases by 3 for each 1 At $x = 0$, $y = 5 - 3 = 2$, so $y = 3x + 2$ $3a + 2 = 20 \rightarrow a = 6$ <i>1 mark: 3</i> <i>1 mark: rule</i> <i>1 mark: a = 6</i>	3
2	$m = 2$; $(-1.5, 0)$	$7 = 2m + 3 \rightarrow m = 2$ $y = 2x + 3$; set $y = 0$ $2x = -3 \rightarrow x = -1.5$ <i>1 mark: m</i> <i>1 mark: y = 0</i> <i>1 mark: (-1.5, 0)</i>	3
3	18.75 square units	Lines meet where $2x + 1 = -x + 7$: $x = 2$, $y = 5$ x-intercepts: -0.5 and 7, so base = 7.5 $\text{Area} = \frac{1}{2} \times 7.5 \times 5 = 18.75$ <i>1 mark: (2, 5)</i> <i>1 mark: base</i> <i>1 mark: area</i>	3

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Q	Answer	Working / sample response	Marks
4	(1, 10), (2, 7), (3, 4), (4, 1)	$x = 1, 2, 3, 4$ give $y = 10, 7, 4, 1$; $x = 5$ gives $y = -2$ <i>1 mark: 3 points</i> <i>1 mark: all 4, no extras</i>	2