

WA8MNALP1

Linear and non-linear patterns and relationships

Core + Challenge

Gradient and y-Intercept — Marking Key

I can find the gradient from a graph or two points, read m and c from $y = mx + c$ and write the equation of 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	4	$m = 4$
2	-7	$c = -7$
3	-2	$y = -2x + 6$
4	$\frac{1}{3}$	$\frac{x}{3} = \frac{1}{3}x$
5	3	$\frac{6}{2}$
6	-2	$\frac{-4}{2}$
7	0	rise 0: horizontal
8	2	$\frac{8}{4}$
9	$\frac{3}{2}$	$\frac{6}{4}$
10	2	up 2 for every 1 across
11	1	crosses at (0, 1)
12	$-\frac{1}{2}$	down 1 for every 2 across
13	0	horizontal
14	$y = -2$	horizontal through (0, -2)
15	$y = 5x - 2$	$y = mx + c$
16	$y = -x + 4$	$c = 4$

B

Core answers, working and marks

/ 22 marks

Q	Answer	Working / sample response	Marks
1	$m = 2, c = -2; y = 2x - 2$	Through (0, -2) and (3, 4): rise 6, run 3 $\rightarrow m = 2$ $c = -2$ $y = 2x - 2$ <i>1 mark: m</i> <i>1 mark: c</i> <i>1 mark: equation</i>	3
2	$m = -2$	$m = \frac{-7-5}{4+2} = \frac{-12}{6} = -2$ <i>1 mark: rise $\div$ run</i> <i>1 mark: -2</i>	2
3	uphill, downhill, horizontal	$m = 3 > 0, m = -1 < 0, m = 0$ <i>1 mark: 2 correct</i> <i>1 mark: all 3</i>	2
4	$y = -3x + 7$	When $x = 0, y = 7$, so $c = 7$ y goes down 3 each step: $m = -3$ <i>1 mark: m</i> <i>1 mark: equation</i>	2
5	$y = \frac{1}{2}x + 2$	x up 2, y up 1: $m = \frac{1}{2}$ Work back from (2, 3): $c = 3 - 1 = 2$ $y = \frac{1}{2}x + 2$ <i>1 mark: m</i> <i>1 mark: c</i> <i>1 mark: equation</i>	3
6	$\frac{1}{15}$; yes	$m = \frac{0.6}{9} = \frac{1}{15}$ $\frac{1}{15} < \frac{1}{14}$, so it is less steep: it meets the standard <i>1 mark: $\frac{1}{15}$</i> <i>1 mark: yes with reason</i>	2
7	$m = -25, c = 200$	-25: the tank loses 25 L each hour 200: the tank starts with 200 L <i>1 mark each with meaning</i>	2
8	$y = -\frac{3}{4}x + 3$	Through (0, 3) and (4, 0): rise -3, run 4 $m = -\frac{3}{4}, c = 3$ <i>1 mark: m</i> <i>1 mark: equation</i>	2
9	$y = -4x + 9$	$1 = -4(2) + c \rightarrow c = 9$ <i>1 mark: $c = 9$</i> <i>1 mark: equation</i>	2

Gradient and y-Intercept · WA8MNALP1

Q	Answer	Working / sample response	Marks
10	$y = 3x - 1$	$m = \frac{12}{4} = 3$ $2 = 3(1) + c \rightarrow c = -1$ <i>1 mark: m</i> <i>1 mark: equation</i>	2

C

Reasoning *sample answers and marking criteria*

/ 9 marks

Q	Answer	Working / sample response	Marks
1	$m = 3$	She calculated run $\div$ rise instead of rise $\div$ run. $m = \frac{10-4}{3-1} = \frac{6}{2} = 3$ <i>1 mark: error</i> <i>1 mark: 3</i>	2
2	Rise 0; run 0	Horizontal: the rise is 0, so $m = 0 \div \text{run} = 0$. Vertical: the run is 0, and we cannot divide by 0. So a vertical line has no (undefined) gradient. <i>1 mark: horizontal</i> <i>1 mark: vertical run 0</i> <i>1 mark: cannot divide by 0</i>	3
3	Yes	A straight line has the same steepness everywhere, so rise $\div$ run is the same for any two points. <i>1 mark: yes</i> <i>1 mark: reason</i>	2
4	False: $m = -2$	Rewrite as $y = -2x + 5$: the gradient is the coefficient of x (-2); 5 is the y-intercept. <i>1 mark: false</i> <i>1 mark: reason</i>	2

D

Challenge *solutions and marking criteria*

/ 11 marks

Q	Answer	Working / sample response	Marks
1	$k = 2$	Gradient from (5, 11) to (7, 17): $\frac{6}{2} = 3$ From $x = 5$ back to $x = 2$ is 3 steps: $11 - 3 \times 3$ $k = 2$ <i>1 mark: $m = 3$</i> <i>1 mark: method</i> <i>1 mark: $k = 2$</i>	3
2	(0, 3) and (-4.5, 0)	$1 = \frac{2}{3}(-3) + c \rightarrow c = 3$ $y = \frac{2}{3}x + 3$; set $y = 0$ $\frac{2}{3}x = -3 \rightarrow x = -4.5$ <i>1 mark: c</i> <i>1 mark: $y = 0$</i> <i>1 mark: x-intercept</i>	3

Gradient and y-Intercept · WA8MNALP1

Q	Answer	Working / sample response	Marks
3	\$2 per GB, \$23 fee; C = 2g + 23; \$53	$m = \frac{43-31}{10-4} = \frac{12}{6} = 2$ $31 = 2(4) + c \rightarrow c = 23$ $C = 2(15) + 23 = 53$ 1 mark: \$2 1 mark: \$23 and rule 1 mark: \$53	3
4	Opposite sides have equal gradients	$AB: \frac{2}{4} = \frac{1}{2}, DC: \frac{2}{4} = \frac{1}{2}$ $AD: \frac{4}{1} = 4, BC: \frac{4}{1} = 4: \text{ both pairs of opposite sides are parallel}$ 1 mark: gradients 1 mark: conclusion	2