

GCSE (9–1) MATHEMATICS

Gradient and Intercept

Pearson Edexcel-style Topic Practice

Based on Pearson Edexcel GCSE Mathematics (1MA1)

Name _____

Date _____

Instructions

- Answer all questions.
- Write your answers in the spaces provided.
- You must show all your working.
- Section A: you must not use a calculator.
- Section B: you may use a calculator.

Information

- The marks for each question are shown in brackets.
- The questions suit both Foundation and Higher tier students.
- Diagrams are not drawn accurately unless the question says they are. Graphs drawn on a grid are accurate.
- The total mark for this paper is 43.

These are original practice questions written in the style of Pearson Edexcel GCSE Mathematics. They are not official Pearson examination questions.

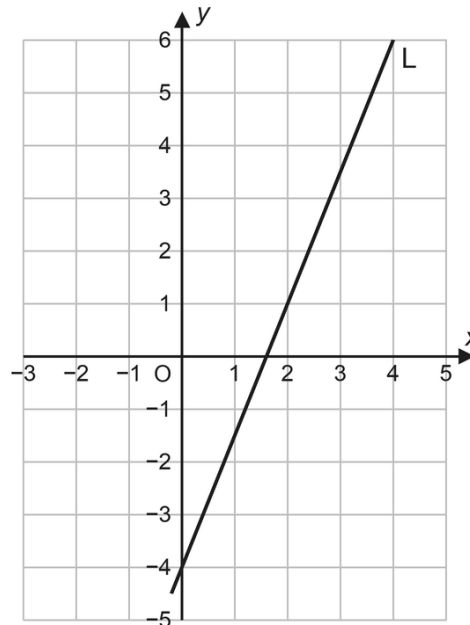
Total marks

43

SECTION A

You must not use a calculator in this section.

- 1 The grid shows a straight line, **L**.



- (a) Write down the coordinates of the point where **L** crosses the y-axis.

Answer

(1)

- (b) Work out the gradient of **L**.

Answer

(2)

- (c) Write down an equation of **L**.

Answer

(1)

(Total for Question 1 = 4 marks)

- 2 A straight line has equation $y = 7 - 3x$

(a) Write down the gradient of the line.

Answer

(1)

(b) Write down the coordinates of the point where the line crosses the y-axis.

Answer

(1)

(c) The points (5, 1), (5, 4) and (5, -3) all lie on a different straight line. Write down the equation of this line.

Answer

(1)

(Total for Question 2 = 3 marks)

- 3 A is the point (-3, 2). B is the point (5, 8).

(a) Work out the gradient of the line AB.

Answer

(2)

(b) Priya works out the gradient of the line through the points C(1, 9) and D(4, 3). Here is her working.

$$\text{gradient} = (9 - 3) \div (4 - 1) = 6 \div 3 = 2$$

(i) Explain the mistake Priya has made.

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(1)

Question 3 continued

- (ii) Work out the correct gradient of the line CD.

Answer

(1)

(Total for Question 3 = 4 marks)

- 4 The line L has equation $3x + 4y = 20$

- (a) Find the gradient of L.

Answer

(2)

- (b) Find the coordinates of the point where L crosses the y-axis.

Answer

(1)

(Total for Question 4 = 3 marks)

- 5 Here are the equations of four straight lines.

Line	Equation
A	$y = 2x + 5$
B	$y = 5 - 2x$
C	$2y = 4x - 3$
D	$y = \frac{1}{2}x + 5$

- (a) Two of the lines are parallel. Write down the letters of these two lines. You must give a reason for your answer.

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(2)

Question 5 continued

- (b) Find an equation of the line that is parallel to $y = 3x - 4$ and passes through the point $(2, 11)$.

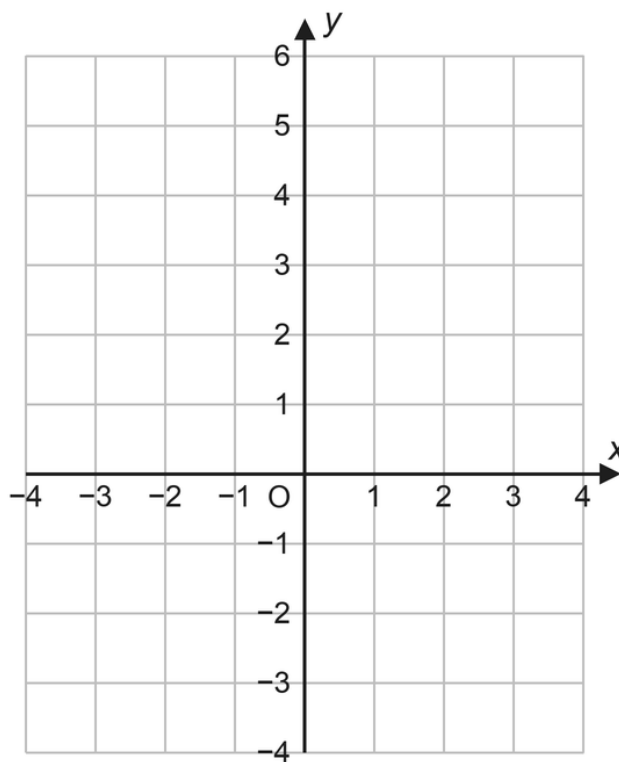
Answer

(3)

(Total for Question 5 = 5 marks)

- 6 The line **L** passes through the point $(0, 3)$ and has gradient -2 .

On the grid, draw the line **L**.



(2)

(Total for Question 6 = 2 marks)

- 7 Find an equation of the line that passes through the points $(1, -2)$ and $(5, 10)$.

Answer

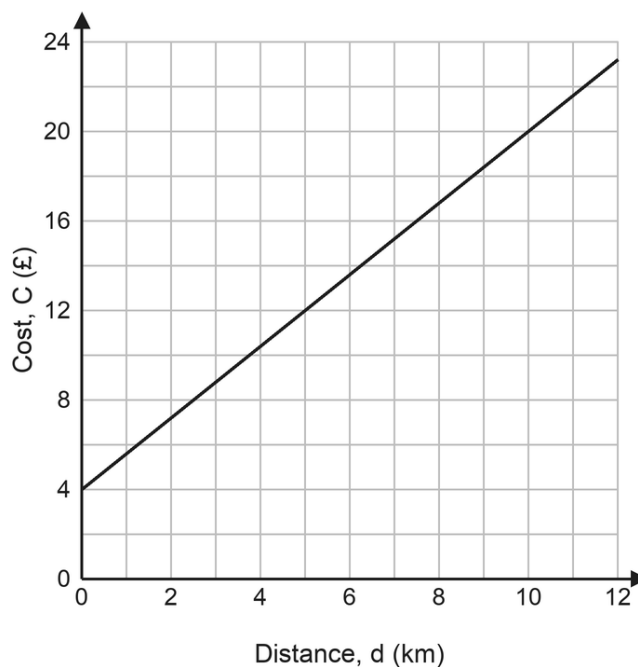
(3)

(Total for Question 7 = 3 marks)

SECTION B

You may use a calculator in this section.

- 8 A taxi company works out the cost of a journey with a fixed charge plus an amount for each kilometre travelled. The graph shows the cost, C pounds, of a journey of d kilometres.



- (a) Write down the fixed charge.

Answer

(1)

- (b) Work out the gradient of the line.

Answer

(2)

- (c) Explain what the gradient represents.

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(1)

Question 8 continued

- (d) Write down a formula for C in terms of d.

Answer

(1)

- (e) A different company charges £2.10 for each kilometre, with no fixed charge. Sam is going on a 7 km journey. Which company is cheaper for Sam's journey? You must show all your working.

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(3)

(Total for Question 8 = 8 marks)

- 9 P is the point (2.5, 3.6). Q is the point (6.5, 13.2).

- (a) Work out the gradient of the line PQ.

Answer

(2)

- (b) Find an equation of the line PQ. Give your answer in the form $y = mx + c$

Answer

(2)

Question 9 continued

- (c) Does the point (12, 26.4) lie on the line PQ? You must show how you get your answer.

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(2)

(Total for Question 9 = 6 marks)

- 10** Water drains out of a tank at a constant rate. The table shows the volume of water, V litres, in the tank t minutes after a tap is opened.

t (minutes)	0	4	10
V (litres)	350	284	185

The graph of V against t is a straight line.

- (a) Work out the gradient of the line.

Answer

(2)

- (b) What does the gradient tell you about the water in the tank?

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(1)

- (c) How long after the tap is opened is the tank empty? Give your answer to the nearest minute.

Answer minutes

(2)

(Total for Question 10 = 5 marks)

TOTAL FOR PAPER = 43 MARKS

Mark scheme

General marking guidance: M marks are for a correct method. A marks are for an accurate answer and depend on the M mark before them. B marks are for a correct answer or statement on its own. C marks are for a clear conclusion that is supported by working. oe means "or equivalent", cao "correct answer only" and ft "follow through" from an earlier wrong answer.

Question number	Answer	Additional guidance	Mark
1(a)	$(0, -4)$	B1 cao Accept $x = 0, y = -4$	(1)
1(b)	$\frac{5}{2}$ oe	M1 for a correct method, e.g. $(1 - (-4)) \div (2 - 0)$ or a triangle showing 5 up and 2 across A1 for $\frac{5}{2}$ oe, e.g. 2.5 or $2\frac{1}{2}$ Do not accept $\frac{2}{5}$	(2)
1(c)	$y = \frac{5}{2}x - 4$ oe	B1 ft their gradient in (b) and their intercept in (a) Must be an equation: " $\frac{5}{2}x - 4$ " on its own does not score Accept $y = 2.5x - 4$	(1)

(Total for Question 1 = 4 marks)

Question number	Answer	Additional guidance	Mark
2(a)	-3	B1 cao Do not accept 3 or 7	(1)
2(b)	$(0, 7)$	B1 cao	(1)
2(c)	$x = 5$	B1 cao Do not accept $y = 5$	(1)

(Total for Question 2 = 3 marks)

Question number	Answer	Additional guidance	Mark
3(a)	$\frac{3}{4}$ oe	M1 for $(8 - 2) \div (5 - (-3))$ or $6 \div 8$ oe A1 for $\frac{3}{4}$ oe, e.g. 0.75 or $\frac{6}{8}$	(2)
3(b)(i)	She has subtracted the y-coordinates in one order and the x-coordinates in the other order. Accept any explanation that identifies the inconsistent order of subtraction, e.g. - the y and x differences must use the points in the same order - if she uses $4 - 1$ on the bottom, she should use $3 - 9$ on the top	C1 for identifying the inconsistent order of subtraction Do not award C1 for "the gradient should be negative", "the line slopes down" or "the answer should be -2" without the subtraction-order error	(1)

Question number	Answer	Additional guidance	Mark
3(b)(ii)	-2	B1 cao	(1)

(Total for Question 3 = 4 marks)

Question number	Answer	Additional guidance	Mark
4(a)	$-\frac{3}{4}$ oe	M1 for rearranging to make y the subject, e.g. $4y = 20 - 3x$ or $y = 5 - \frac{3}{4}x$ A1 for $-\frac{3}{4}$ oe, e.g. -0.75 Do not accept 3 or -3	(2)
4(b)	(0, 5)	B1 cao	(1)

(Total for Question 4 = 3 marks)

Question number	Answer	Additional guidance	Mark
5(a)	A and C, because both lines have gradient 2	B1 for A and C C1 for a reason that refers to the gradients, e.g. "C is $y = 2x - 1.5$, so A and C both have gradient 2" Do not award C1 for "both have 2x" unless C has been rearranged or divided by 2	(2)
5(b)	$y = 3x + 5$	M1 for using gradient 3, e.g. $y = 3x + c$ M1 for substituting (2, 11), e.g. $11 = 3 \times 2 + c$ A1 for $y = 3x + 5$ oe	(3)

(Total for Question 5 = 5 marks)

Question number	Answer	Additional guidance	Mark
6	A straight line through (0, 3) and, for example, (1, 1), (2, -1) and (3, -3)	B2 for a correct straight line drawn across the grid (at least from $x = -1$ to $x = 3$) B1 for a line through (0, 3) with a different negative gradient, or a line with gradient -2 that does not pass through (0, 3)	(2)

(Total for Question 6 = 2 marks)

Question number	Answer	Additional guidance	Mark
7	$y = 3x - 5$	M1 for a method to find the gradient, e.g. $(10 - (-2)) \div (5 - 1) = 3$ M1 for substituting a point into $y = \text{their } m \times x + c$, e.g. $-2 = 3 \times 1 + c$ A1 for $y = 3x - 5$ oe	(3)

(Total for Question 7 = 3 marks)

Question number	Answer	Additional guidance	Mark
8(a)	£4	B1 cao	(1)
8(b)	1.6 oe	M1 for a correct method, e.g. $(20 - 4) \div 10$ A1 for 1.6 oe Accept answers in the range 1.55 to 1.65 if read from a less accurate triangle	(2)
8(c)	The cost for each kilometre (£1.60 per kilometre)	C1 for a statement that the gradient is the cost of each kilometre ft their gradient in (b) Do not accept "how steep the line is" on its own	(1)
8(d)	$C = 1.6d + 4$ oe	B1 ft their answers to (a) and (b) Must be a formula with C as the subject	(1)
8(e)	First company: $1.6 \times 7 + 4 = £15.20$ Second company: $2.10 \times 7 = £14.70$ The second company is cheaper.	M1 for working out the cost for either company for 7 km, e.g. $1.6 \times 7 + 4$ or 2.1×7 A1 for £15.20 and £14.70 C1 (dependent on M1) for "the second company" with both costs correct Accept costs read from the graph for the first company if the reading is correct	(3)

(Total for Question 8 = 8 marks)

Question number	Answer	Additional guidance	Mark
9(a)	2.4	M1 for $(13.2 - 3.6) \div (6.5 - 2.5)$ or $9.6 \div 4$ A1 cao	(2)

Question number	Answer	Additional guidance	Mark
9(b)	$y = 2.4x - 2.4$	M1 for substituting P or Q into $y = \text{their } m \times x + c$, e.g. $3.6 = 2.4 \times 2.5 + c$ A1 for $y = 2.4x - 2.4$ oe	(2)
9(c)	Yes. $2.4 \times 12 - 2.4 = 26.4$	M1 for substituting $x = 12$ into their equation, e.g. $2.4 \times 12 - 2.4$, or for finding the gradient from P or Q to (12, 26.4) C1 for "yes" with 26.4 shown (or a gradient of 2.4 shown) ft their equation from (b) for M1 only	(2)

(Total for Question 9 = 6 marks)

Question number	Answer	Additional guidance	Mark
10(a)	-16.5	M1 for $(185 - 350) \div (10 - 0)$ or $(284 - 350) \div 4$ oe A1 for -16.5 Do not accept 16.5 for A1	(2)
10(b)	The volume of water goes down by 16.5 litres every minute.	C1 for a statement about the rate: 16.5 litres leave the tank each minute ft their gradient in (a) Must mention litres (or water) and minutes (or time)	(1)
10(c)	21 minutes	M1 for $350 \div 16.5 (= 21.2...)$ or solving $0 = 350 - 16.5t$ A1 for 21	(2)

(Total for Question 10 = 5 marks)