

GCSE MATHEMATICS

Gradient and Intercept

AQA-style Topic Practice

Based on AQA GCSE Mathematics (8300)

Tier: Foundation and Higher

Name _____

Date _____

Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Answer all questions in the spaces provided.
- Do all rough work in this booklet.
- Section A: you must not use a calculator.
- Section B: you may use a calculator.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 46.
- 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.

Advice

- In all calculations, show clearly how you work out your answer.

For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
TOTAL	

These are original practice questions written in the style of AQA GCSE Mathematics (8300). They are not official AQA examination questions and are not endorsed by AQA.

SECTION A

You must not use a calculator in this section.

- 1** (a) Circle the gradient of the line $y = 6 - 4x$

Circle your answer.

[1 mark]

6

4

-4

-6

- (b) Circle the coordinates of the point where the line $y = 2x - 7$ crosses the y-axis.

Circle your answer.

[1 mark]

(0, 2)

(0, -7)

(-7, 0)

(3.5, 0)

- (c) Circle the equation of the line that is parallel to $y = 5x + 1$

Circle your answer.

[1 mark]

$y = x + 5$

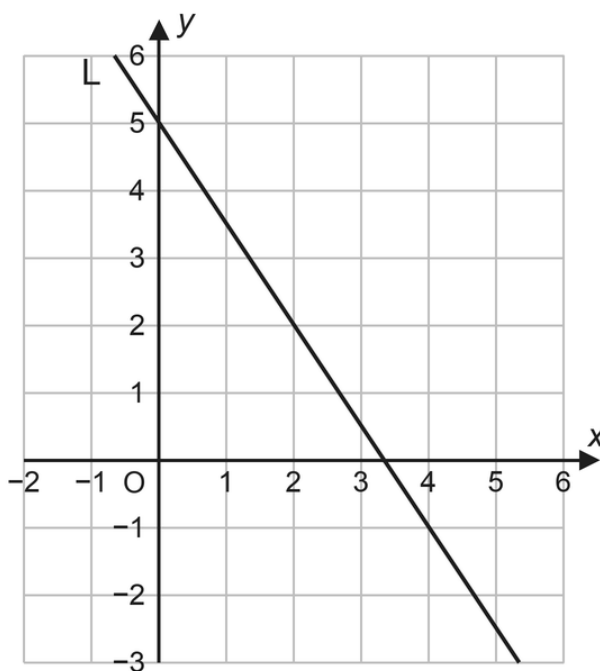
$y = 5x - 3$

$y = -5x + 1$

$y = \frac{1}{5}x + 1$

- 2 Figure 1 shows the line L on a grid.

Figure 1



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

[2 marks]

Answer _____

- (b) Write down the equation of line L.

[1 mark]

Answer _____

- 2(c) The point (10, k) lies on line L. Work out the value of k.

[2 marks]

Answer _____

- 3 The equation of a straight line is $2x + 3y = 12$

- (a) Show that the gradient of the line is $-\frac{2}{3}$

[2 marks]

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

[1 mark]

Answer _____

- 4 Amir is asked for the gradient and the y-intercept of the line $y = 3 - 2x$

Amir writes: gradient = 3, y-intercept = (0, -2)

- (a) Explain the mistake Amir has made.

[1 mark]

- (b) Write down the correct gradient of the line.

[1 mark]

Answer _____

- 4(c) Write down the coordinates of the correct y-intercept. [1 mark]

Answer _____

- 5 Find the equation of the straight line that passes through the points $(-2, 7)$ and $(4, -5)$. Give your answer in the form $y = mx + c$ [3 marks]

Answer _____

- 6 (a) Write down the equation of the x-axis. [1 mark]

Answer _____

- (b) A straight line passes through the points $(-1, 4)$ and $(6, 4)$.
Write down the equation of the line. [1 mark]

Answer _____

- (c) Write down the gradient of the line in part (b). [1 mark]

Answer _____

7 Line M is parallel to the line with equation $2y = x + 6$

Line M passes through the point (8, 1).

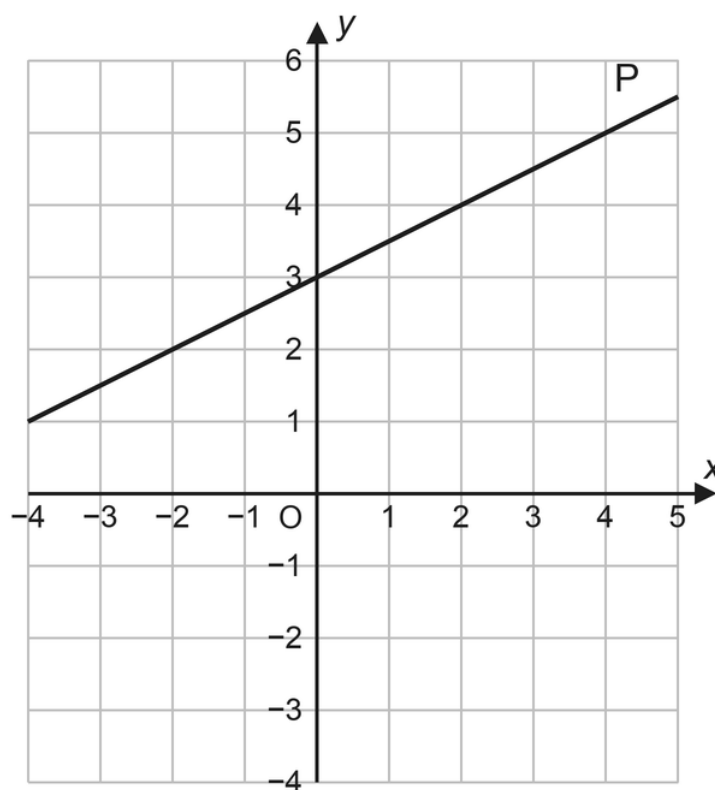
Find the equation of line M.

[3 marks]

Answer _____

- 8 Figure 2 shows the line P on a grid.

Figure 2



On Figure 2, draw the line that is parallel to line P and passes through the point $(0, -2)$.

[2 marks]

SECTION B

You may use a calculator in this section.

- 9** A gym charges a joining fee and then a fixed amount each month.

The total cost, £C, of joining the gym and using it for n months is given by

$$C = 32.5n + 45$$

- (a) Write down the joining fee.

[1 mark]

Answer _____

- (b) Explain what the number 32.5 represents in this formula.

[1 mark]

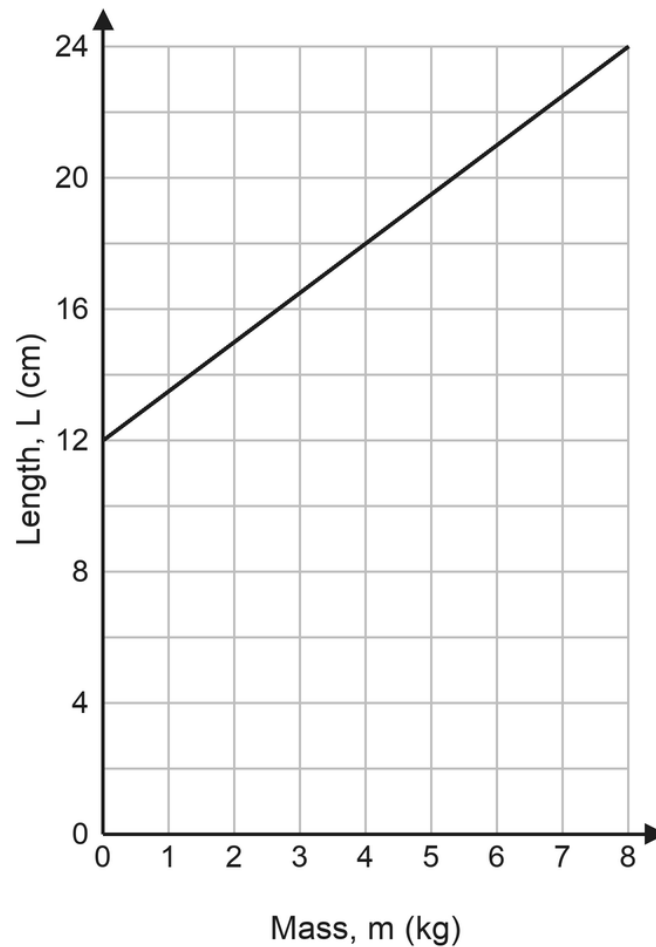
- (c) Kamal has paid £435 in total. How many months has Kamal used the gym?

[2 marks]

Answer _____ months

- 10** Different masses are hung from a spring. Figure 3 shows the length of the spring, L cm, when a mass of m kg is hung from it.

Figure 3



- (a) Write down the length of the spring when no mass is hung from it. **[1 mark]**

Answer _____ cm

- (b) Work out the gradient of the line. **[2 marks]**

Answer _____

10(c) What does the gradient represent? **[1 mark]**

10(d) Write down a formula for L in terms of m. **[1 mark]**

Answer _____

10(e) Use your formula to work out the mass that gives a length of 23.4 cm. **[2 marks]**

Answer _____ kg

11 A is the point (1.2, -0.6). B is the point (3.7, 4.4).

(a) Show that the gradient of the line AB is 2 **[2 marks]**

(b) Find the equation of the line AB. Give your answer in the form $y = mx + c$ **[2 marks]**

Answer _____

- 11(c)** The point C lies on the line AB. The x-coordinate of C is 10.5

Work out the y-coordinate of C.

[1 mark]

Answer _____

- 12** A candle burns down at a constant rate.

After burning for 2 hours, the height of the candle is 18 cm.

After burning for 5 hours, the height of the candle is 12.6 cm.

The graph of the height of the candle, h cm, against time, t hours, is a straight line.

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

[2 marks]

Answer _____

- (b) Explain what the gradient tells you about the candle.

[1 mark]

- (c) Work out the height of the candle before it was lit.

[2 marks]

Answer _____ cm

END OF QUESTIONS

Mark scheme

Glossary: M marks are for a correct method which could lead to a correct answer. A marks are for an accurate answer and depend on the M mark before them. B marks are independent of method. M1dep is a method mark that depends on the previous method mark. ft means follow through from an earlier answer, oe or equivalent, and cao correct answer only.

Q	Answer	Mark	Comments
1(a)	-4	B1	
	Additional Guidance If more than one answer is circled, award no mark		
1(b)	(0, -7)	B1	
	Additional Guidance If more than one answer is circled, award no mark		
1(c)	$y = 5x - 3$	B1	
	Additional Guidance If more than one answer is circled, award no mark		
Total		3	

Q	Answer	Mark	Comments
2(a)	$(-1 - 5) \div (4 - 0)$ or $-6 \div 4$	M1	oe
	$-\frac{3}{2}$	A1	oe; allow -1.5
	Additional Guidance - M1 may be implied by a triangle on the graph showing 3 down for every 2 across, or 6 down for every 4 across - Do not accept $\frac{3}{2}$ or $\frac{2}{3}$ for A1		
2(b)	$y = -\frac{3}{2}x + 5$	B1ft	oe; ft their gradient from (a) with c = 5
	Additional Guidance - Answer must be an equation - Allow $y = 5 - 1.5x$		
2(c)	$-\frac{3}{2} \times 10 + 5$	M1	substituting $x = 10$ into their equation from (b); ft their equation for M1 only
	$k = -10$	A1	
	Additional Guidance A value read from beyond the grid without working scores 0		
Total		5	

Q	Answer	Mark	Comments
3(a)	$3y = -2x + 12$ or $y = -\frac{2}{3}x + 4$	M1	any correct first step that makes y (or 3y) the subject
	$y = -\frac{2}{3}x + 4$ and the gradient identified as $-\frac{2}{3}$	A1	"show that" mark
Additional Guidance - For A1 the equation must be seen in the form $y = -\frac{2}{3}x + c$, or equivalent, before the gradient is stated - Do not award A1 for stating $-\frac{2}{3}$ with no rearrangement shown			
3(b)	(0, 4)	B1	allow $x = 0$, $y = 4$
Total		3	

Q	Answer	Mark	Comments
4(a)	He has taken the number on its own (3) as the gradient and the coefficient of x (-2) as the intercept	B1	or an equivalent explanation
Additional Guidance - Accept any explanation that identifies that the gradient is the number multiplying x, not the constant term, e.g. - he has mixed up m and c - the equation is not written in the order $y = mx + c$, so the gradient is not the first number - Do not award for "the gradient should be negative" or "the answers are the wrong way round" without saying which number is which			
4(b)	-2	B1	do not accept 2
4(c)	(0, 3)	B1	allow $x = 0$, $y = 3$
Total		3	

Q	Answer	Mark	Comments
5	$(-5 - 7) \div (4 - (-2))$ or $-12 \div 6$ or gradient = -2	M1	
	$7 = -2 \times -2 + c$ or $-5 = -2 \times 4 + c$	M1dep	ft their gradient
	$y = -2x + 3$	A1	allow $y = 3 - 2x$
Additional Guidance The second M1 is dependent on the first			
Total		3	

Q	Answer	Mark	Comments
6(a)	$y = 0$	B1	do not accept $x = 0$
6(b)	$y = 4$	B1	do not accept $x = 4$
6(c)	0	B1	ignore reasons given with the answer
Total		3	

Q	Answer	Mark	Comments
7	$y = \frac{1}{2}x + 3$ or gradient = $\frac{1}{2}$	M1	
	$1 = \frac{1}{2} \times 8 + c$	M1dep	
	$y = \frac{1}{2}x - 3$	A1	oe, e.g. $y = 0.5x - 3$ or $2y = x - 6$
	Additional Guidance - The second M1 is dependent on the first - Do not award the first M1 for a gradient of 1 or 2 (taken from $2y = x + 6$ without dividing by 2)		
Total		3	

Q	Answer	Mark	Comments
8	A straight line through $(0, -2)$ with gradient $\frac{1}{2}$, e.g. through $(-4, -4)$, $(2, -1)$ and $(4, 0)$	B2	B1 for a line through $(0, -2)$ with a different positive gradient, or a line parallel to line P that does not pass through $(0, -2)$
	Additional Guidance The line must be ruled and cover at least from $x = -2$ to $x = 4$		
Total		2	

Q	Answer	Mark	Comments
9(a)	£45	B1	allow 45
9(b)	The amount charged each month (£32.50 a month)	B1	must refer to the cost per month
	Additional Guidance Do not accept "the gradient" on its own		
9(c)	$(435 - 45) \div 32.5$ or $32.5n + 45 = 435$	M1	allow $390 \div 32.5$
	12	A1	
Total		4	

Q	Answer	Mark	Comments
10(a)	12	B1	
10(b)	$(18 - 12) \div (4 - 0)$ or $12 \div 8$	M1	oe; any correct difference in L divided by the matching difference in m, read from the graph
	1.5	A1	
10(c)	The spring gets 1.5 cm longer for each kilogram	B1ft	ft their gradient from (b)
Additional Guidance • Must refer to the increase in length for each kilogram (or per kg) • Do not accept "how steep the line is"			
10(d)	$L = 1.5m + 12$	B1ft	oe; ft their answers to (a) and (b)
Additional Guidance • Answer must be a formula with L as the subject			
10(e)	$1.5m + 12 = 23.4$ or $(23.4 - 12) \div 1.5$	M1	ft their formula from (d)
	7.6	A1	
Additional Guidance • A value read from the graph without using the formula scores M0 A0			
Total		7	

Q	Answer	Mark	Comments
11(a)	$(4.4 - (-0.6)) \div (3.7 - 1.2)$	M1	
	$5 \div 2.5 = 2$	A1	"show that" mark
Additional Guidance • For A1, 5 and 2.5, or $5 \div 2.5$, must be seen			
11(b)	$-0.6 = 2 \times 1.2 + c$ or $4.4 = 2 \times 3.7 + c$	M1	
	$y = 2x - 3$	A1	
11(c)	18	B1ft	ft their equation from (b)
Total		5	

Q	Answer	Mark	Comments
12(a)	$(12.6 - 18) \div (5 - 2)$	M1	
	-1.8	A1	do not accept 1.8
12(b)	The height goes down by 1.8 cm every hour	B1ft	ft their gradient from (a)
	Additional Guidance Must refer to height (or cm) and time (or hours)		
12(c)	$18 + 2 \times 1.8$ or $12.6 + 5 \times 1.8$	M1	ft their gradient
	21.6	A1	
Total		5	

Elite Learners Assessment Objectives Summary

For teachers: how the marks in this paper divide between the three assessment objectives of AQA GCSE Mathematics (8300). This summary is not part of the AQA-style mark scheme.

AO1 — use and apply standard techniques	22 marks (48%)
AO2 — reason, interpret and communicate mathematically	12 marks (26%)
AO3 — solve problems within mathematics and in other contexts	12 marks (26%)
Total	46 marks