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GCSE MATHS

Algebra

Edexcel 1MA1 | Subtopic collection Topic 23

Straight-line graphs

Foundation tier

Answers and examiner comments

44	2012-2025	Foundation
question groups	available papers	tier

Using this booklet

1. Answer numbers match the companion question booklet.
2. Follow the original question number on marking tables.
3. Examiner comments are included where available.

Name _____ **Date** _____

Some entries use full source marking material in an appendix. Any unavailable mark schemes are identified beside the relevant answer.

5	(a)(i)		(2, 3)	2	B1 cao
	(ii)		(–3, 1)		B1 cao
	(b)		Point plotted at (3, –4)	1	B1 cao

11	(a)		(1, 2)	1	B1 cao (accept coordinates just shown on the grid)
	(b)		(0, –3)	1	B1 cao (accept coordinates just shown on the grid)
	(c)		(3, –2)	1	B1 for (3, –2) or (–3, –4) or (–1, 6) [SC: B1 for coordinates reversed, (–2, 3) or (–4, –3) or (6, –1) if coordinates reversed in parts (a) **and** (b)]

1MA0_1F

7	(a)		(4, 5)	1	B1 cao
	(b)		*D* marked on diagram	1	B1 for *D* marked at (2, − 1) (± 2 mm)

5MB2F_01

11	(a)(i)		(4, 3)	2	B1 cao
	(ii)		(–4, –1)		B1 cao
	(b)		(0, 1)	2	M1 for (0, 1) marked on the graph or (0, y) or (x, 1) A1 cao

6	(a)		(2,3)	1	B1 cao
	(b)		(−3, 3) plotted	1	B1 cao

Original question 22

The full source mark scheme begins on page 70. Use the original paper code, tier and question number shown above.

9	(a)(i) (a)(ii) (b)		(-2, -3) Cross at (5, 2) y = 3	2 1	B1 cao B1 professional judgement B1 for correct line (at least 2cm spanning the *y* axis) with professional judgement

11	(a)		(8, 1)	1	B1 cao
	(b)		Coordinate shown	2	B2 for N at (5, k) where $k \geq 6.2$) **or** (2, 7) **or** (8,7) (B1 for N at (5, k) where $k < 6.2$)

16	(a)		(1, 4)	1	B1 cao
	(b)		cross at (−3, 2)	1	B1 for cross at (−3, 2)
	(c)		$x = 3$	1	B1 cao

8	(a)		5, 3	1	B1 cao
	(b)		2, 4	1	B1 cao
	(c)		Point marked	1	B1 cao

PAPER: 1MA0_2F

Question		Working	Answer	Mark	Notes
25		x -2 -1 0 1 2 3 y -7 -5 -3 -1 1 3	Straight line from (–2, –7) to (3, 3)	4	**(Table of values)** C1 for axes scaled and labelled M1 for at least 2 correct attempts to find points by substituting values of x M1 ft for plotting at least 2 of their points (any points plotted from their table must be plotted correctly) A1 for correct line between $x = -2$ and $x = 3$ **(No table of values)** C1 for axes scaled and labelled M1 for at least 2 correct points with no more than 2 incorrect points M1 for at least 2 correct points (and no incorrect points) plotted OR line segment of $y = 2x - 3$ drawn A1 for correct line between $x = -2$ and $x = 3$ **(Use of $y = mx+c$)** C1 for axes scaled and labelled M1 for line drawn with gradient of 2 OR line drawn with a y intercept of –3 M1 for line drawn with gradient of 2 AND with a y intercept of –3 A1 for correct line between $x = -2$ and $x = 3$ [SC B2 (indep of C1) for the correct line between $x = 0$ and $x = 3$, ignore any additional incorrect line segment(s)]

PAPER: 1MA0_2F					
Question		Working	Answer	Mark	Notes
*26			No + reason	4	M1 for intention to find the circumference eg 140 × π (= 439.82...) A1 for circumference = 439 – 440 M1 (dep on previous M1) for a complete method shown that could arrive at two figures that are comparable, eg "C"÷60×12 (=87.96..), 90÷12×60 (=450) , 90×60 ÷ C"(=12.27), "C"÷90×12 (=58.64..) C1 (dep on both M marks) for No and explanation that shows a correct comparison eg only 84 people could sit around the tables or that 13 tables are needed or that 480 cm is needed.

Modifications to the mark scheme for Modified Large Print (MLP) papers.

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Measurements of length: ±5 mm

PAPER: 1MA0_2F			
Question		**Modification**	**Notes**
1		2 cm grid – wording added 'each square represents a one centimetre square' –this is also on diagram	
2		Right axis labelled	
4	(a) (b (c) (d)	2 cm grid 4 cm changed to 5 2 cm grid 2 cm grid	
5	(c)	Probability scales lengthened	
7		No map Information put into a table	
13		5.5 cm side changed to 8 cm 35° changed to 45°	M1 for angle of 45° or for line 8 cm long A1 cao
23	(b)	x changed to y	B1 for $3(y+2)$

Question		Working	Answer	Mark	Notes
11	(a)		2, 1	1	B1 cao
	(b)		–2, 3	1	B1 cao
	(c)		Point marked	1	B1 for point marked at (–3, –1)
	(d)		Line $x = 3$ drawn	1	B1 for line $x = 3$ drawn

3	(a)		(4, 2)	1	B1 cao
	(b)		Cross at $(1, \frac{1}{2})$	1	B1 cao

10	(a)		parallel line	1	B1 cao
	(b)		correct net	1	B1 for one correct square drawn

8	(a)		1, 5	1	B1 cao
	(b)		Point D marked	1	B1 cao

9	(a)		E	1	B1 cao
	(b)(i)		*P* marked	2	B1 for correct point marked, eg (1, −1)
	(ii)		coordinates of *P*		B1 for correct coordinates for 'point'

7		(2, –1) or (4, 5) or (–8, –1)	3	M1 for **plotting** one point correctly M1 for plotting all three points correctly A1 **SC B1 ft** their points for coordinates of point giving parallelogram if M0 scored

9	(a)(i) (a)(ii) (b)		(2, −4) Point plotted $y = x$ drawn	2 1	B1 cao B1 for point plotted at (−2,3) B1 for correct line	C C G

2	(a)		(2, 1)	1	B1 cao
	(b)		(0, 5)	1	B1 cao
	(c)		(1, 3)	1	B1 cao
	(d)		Point	1	B1 for point marked, eg at (4, 5) or (4, 3) or (5, 5) or (7, 6) or (3, 4) or (4, 7)

26		comparison	M1 A1	starts to manipulate expression e.g. $3y = 9x – 6$ or $3y = 9x – 5$ gives equation(s) which can be used to show that the gradients of the two lines are the same e.g. $y = 3x – 5/3$

7	(a)		(6 , − 2)	B1	cao
	(b) i		Correct point	B1	cao for point marked at (2, 9)
	(b) ii		Yes with reasoning	B1	Yes with correct substitution 4×2+1=9 **or** by drawing correct line on diagram
	(c)		Correct line	B1	for drawing line $x = -2$ cao

Paper 1MA1: 1F

Question		Modification	Mark scheme notes
24		Diagram enlarged. Crosses changed to solid dots. Wording changed to 'It shows a pattern made from four identical squares.'	Standard mark scheme

Question	Answer	Mark	Mark scheme	Additional guidance
13	D, F, A	C2 (C1	for all 3 correct for 1 or 2 correct)	

Paper: 1MA1/1F

Question	Answer	Mark	Mark scheme	Additional guidance
8 (a)	–2, –1	B1	cao	
(b)	Point at (2, 3)	B1	cao	Allow without label provided unambiguous; allow if the cross is nearer to (2, 3) than other points.
(c)	Line drawn	B1	cao	Label not required; allow hand-drawn line. Allow any length provided intention is clear.

25	7	P1 P1 A1	process to use gradient eg $y = 3x + c$ **or** $c = -6$ **or** $\frac{15-9}{d-5}$ **or** $(15 - 9) \div 3$ **or** (6, 12) (dep) full process to rearrange equation formed to isolate d eg rearrangement of $15 = 3d - 6$ or $3 = \frac{15-9}{d-5}$ **or** for $5 + \frac{15-9}{3}$ cao	Condone use of a letter other than d, for d Must show processes to get as far as $d =$ Award P2 for an answer of (7, 15)

Paper: 1MA1/2F

29	(a)	1, –4	B1	cao	Brackets are given on the answer line, ignore any extra brackets seen
	(b)	–1 and 3	B2	for both correct answers	
			(B1	for one correct solution or $(x + 1)(x – 3)$ or $(–1, 3)$)	

Modifications to the mark scheme for Modified Large Print (MLP) papers: 1MA1 1F

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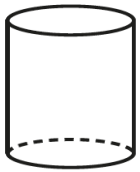
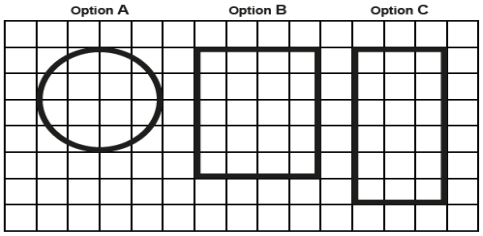
PAPER: 1MA1/1F			
Question		**Modification**	**Mark scheme notes**
6		Horizontal lines added underneath the information.	Standard mark scheme
7		Diagram enlarged. Right axis labelled. Graph lines made thicker. Axes labels moved to the left of the horizontal axis and above the vertical axis.	Standard mark scheme
8		Wording 'five' added.	Standard mark scheme
12(a)		Diagram enlarged. Wording added 'Two angles are marked 25°. One angle is marked x°.' Angles moved outside of angle arcs and angle arcs made smaller. Wording added 'Find the value of the angle marked x°.'	Standard mark scheme
12(b)		Diagram enlarged. Angles a, b, c, d, e changed to v, w, x, y, z. Wording added 'Angles v, w, x, y and z are marked on the diagram.' Angles moved outside of angle arcs and angle arcs made smaller. (ii) changed to "Explain why $v + w + x = 235$°"	Standard mark scheme with a, b, c, d, e changed to v, w, x, y, z.
18		Diagram enlarged. Measurements moved above/to the left of diagram. Wording changed to 'It shows a rectangular path, 600 cm long and 120 cm wide'. Braille only: Path labelled 'rectangular path' inside the shape.	Standard mark scheme

PAPER: 1MA1/1F			
Question		**Modification**	**Mark scheme notes**
20		Diagram enlarged. Shapes labelled ‘square A’ and ‘square B’. Labels moved above diagrams. Shading changed to dotty shading.	Standard mark scheme
22(a)		Wording added ‘There are two spaces to fill.’	Standard mark scheme

PAPER: 1MA1/1F			
Question		**Modification**	**Mark scheme notes**
25		Question changed. Model should be provided. Diagram 1  Diagram 2  Look at the diagrams for Question 25. You may be provided with a model. Diagram 1 and the model show a solid cylinder. They are not accurate. Look at Diagram 2 below Diagram 1. Diagram 2 shows three options labelled Option A, Option B and Option C on a grid of squares. Each square on the grid represents a one centimetre square. The cylinder is placed with its flat face on a surface. (a) Which of the options, A, B or C, shows the plan of the cylinder? (1 mark) (b) Remember: Each square on the grid represents a one centimetre square. Using Diagram 2, (i) write down the diameter of the cylinder. (ii) write down the height of the cylinder. (1 mark)	Mark scheme: (a) B1 for Option A Could indicated on the diagram eg by circling etc. Accept a description eg circle (b) B1 for (i) as 4 **or** (ii) as 3, 4, 5 or 6

PAPER: 1MA1/1F			
Question		**Modification**	**Mark scheme notes**
26		Diagram enlarged. Grid cut to make the axes from −7 to 7. Shading changed to dotty shading. Labels removed from inside the shapes. Shapes labelled as 'shape **A**' and 'shape **B**'. Wording added 'It shows shape **A** and shape **B** on a coordinate grid.' Question changed to: (a) Reflect shape **A** in the x-axis. Label the new shape **X**. (1 mark). (b) Shape **X** can be transformed to shape **B** by a translation $\begin{pmatrix} c \\ d \end{pmatrix}$ Find the value of c and the value of d. (2 marks)	Apply the standard mark scheme but in two stages: (a) B1 for showing the reflected shape **X** (need not be labelled if there is only one shape drawn). (b) B2 for $c = -6$ or $d = -1$ (B1 for one correct value or reverse order)
28		Diagram enlarged. Wording changed to 'It shows two rectangles, *ABCD* and *PQRS*.' Rectangle *PQRS* moved to lie landscape below *ABCD*. *PQRS* relabelled to follow clockwise vertex labelling convention prescribed in *ABCD*. Wording changed to 'PQ = 10cm', '$AD = PS$'. Braille only: rectangles labelled 'Rectangle 1' and 'Rectangle 2'.	Standard mark scheme but note the change in vertex labelling.
29		Diagram enlarged. Graph line made thicker.	Standard mark scheme

10	(a)	*A* plotted at (3, 2)	B1	cao	Accept a cross or dot or A written at (3, 2) with or without labelling provided not ambiguous
	(b)	(–1, 0)	B1	cao	Could be shown on the diagram

8	(a)	(2, 3)	B1	cao	
	(b)	(0, −1)	B1	cao	
	(c)	*C* at (–2,1)	B1	cao	If more than one point marked accept if labelled, otherwise not, unless clear

Paper: 1MA1/1F

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PAPER: 1MA1/2F			
Question		**Modification**	**Mark scheme notes**
3		The letter *e* changed to *n*.	Standard mark scheme but note the change in letter.
5		Wording added "Here is a list of seven numbers."	Standard mark scheme
7		Wording added "Look at the table and the diagram for Question 7 in the Diagram Book." Wording "Here are their marks for the test" removed and replaced with "Their marks for the test are shown in the table." Wording "George drew this bar chart to show the marks they got" removed and replaced with "George drew the bar chart in the Diagram Book to show the marks they got." Table enlarged. Diagram enlarged. Shading changed to dotty shading.	Standard mark scheme
8	(a)	Wording added "Look at the diagram for Question 8(a) in the Diagram Book." Wording "ABC is a straight line" removed and replaced with "It shows a straight line ABC. Two angles are marked *x* and 150°." Diagram enlarged. Angles moved outside of the angle arcs, and the arcs have been made smaller. Braille only: The top of the line labelled D. A description added stating the angles shown. Wording added "Two angles are marked *x*° and 150°. ABD is marked *x*°. CBD is marked 150°."	Standard mark scheme

PAPER: 1MA1/2F			
Question		**Modification**	**Mark scheme notes**
8	(b)	Wording added "Look at the diagram for Question 8(b) in the Diagram Book. It shows a right angle and an angle of 280°". Diagram enlarged. Right angle made thicker. Angle moved outside of the angle arc, and the arc has been made smaller.	Standard mark scheme
9		Wording added "Look at the diagram for Question 9 in the Diagram Book." Wording "This scale can be used…" removed and replaced with "It shows a scale which can be used to change between kilometres and miles." Diagram enlarged. Scale markings made longer and thicker. Frame removed in part (b).	Standard mark scheme
11		Wording added "Look at the diagram for Question 11 in the Diagram Book." Wording "Here is a cuboid" removed and replaced with "It shows a cuboid. It has length 15 cm, width 10 cm and height 4 cm" Diagram enlarged. "15 cm" label moved to the left of the cuboid. Braille only: Model provided.	Standard mark scheme
14		Wording added "Look at the diagram for Question 14 in the Diagram Book. It is an incomplete pie chart." "The table below…" Table enlarged. The "number of goals" column widened. Diagram enlarged to allow for use of specialist equipment. Solid dot placed at centre of pie chart. 10° markings added to the pie chart.	Standard mark scheme
15		Letter *x* changed to letter *w*. Wording added "Given that".	Standard mark scheme but note the change in letter.
17		Wording added "Look at the information for Question 17 in the Diagram Book." Information enlarged. Frame removed.	Standard mark scheme.
18		Cut out shape provided for all candidates. Wording added "Look at the diagram for Question 18 in the Diagram Book. It shows triangle A and triangle B on a grid. A cut out shape may be available if you wish to use it." Diagram enlarged. Shading changed to dotty shading. Triangles labelled "triangle A" and "triangle B." Labels moved above the triangles.	Standard mark scheme

PAPER: 1MA1/2F			
Question		**Modification**	**Mark scheme notes**
22		Wording added "Look at the diagram for Question 22 in the Diagram Book. It shows an incomplete Venn diagram." Diagram enlarged. Labels "set A" and "set B" moved above the circles. Braille only: The Venn diagram labelled (i) to (iv).	Standard mark scheme
24	(a)	Wording added "There are four spaces to fill." Table enlarged and turned to vertical format.	Standard mark scheme
24	(b)	Wording added "Look at the diagram for Question 24(b) in the Diagram Book. It shows a grid." Diagram enlarged. Small squares removed and intermediate lines added.	Standard mark scheme
25		Wording added "Look at the diagram for Question 25 in the Diagram Book. It shows a right-angled triangle ABC." Triangle labelled ABC. Wording added "Angle ABC is a right angle, Angle ACB = 34°, AB = x mm, AC=178 mm." Diagram enlarged. Right angle made thicker. Angle moved outside of the angle arc, and the arc has been made smaller.	Standard mark scheme
27		Wording added "Look at the diagram for Question 27 in the Diagram Book." Wording "The diagram shows…" removed and replaced with "It shows…" Wording added "AC = 9 metres, AB = 6 metres" Wording added "Angle BCD=90°". Diagram enlarged. Right angles made thicker.	Standard mark scheme

28	(i)	−4	B1	cao	
	(ii)	(0, 3)	B1	cao	

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PAPER: 1MA1_1F			
Question		**Modification**	**Mark scheme notes**
2		Wording added 'Write the following six numbers…'	Standard mark scheme
6	(a)	Wording added 'Look at the diagram for Question 6(a) in the Diagram Booklet. It shows a quadrilateral labelled *ABCD*.' Wording added '*AB* is parallel to *DC*.'; Wording 'this…' removed and replaced with 'the…' Diagram enlarged. Diagram labelled as *ABCD*.	Standard mark scheme
6	(b)	Wording added 'Look at the diagram for Question 6(b) in the Diagram Booklet. You may be provided with a model. They show a 3-D shape.' Wording 'this…' removed and replaced with 'the..' Diagram enlarged. Dashed line made longer and thicker. Model may be provided.	Standard mark scheme
8		Wording 'Look at the diagram for Question 8 in the Diagram Booklet. It shows a bar chart.' Wording 'below…' removed and replaced with 'in the Diagram Booklet…' Table and diagram enlarged. Axes labels moved to the left of the horizontal axis and above the vertical axis. Shading changed to dotty shading. Open headed arrows. Wording 'this…' removed and replaced with 'the..'	Standard mark scheme

PAPER: 1MA1_1F			
Question		**Modification**	**Mark scheme notes**
11		Wording 'Look at the diagram for Question 11 in the Diagram Booklet.' Wording 'The pictogram shows…' removed and replaced with 'It is an incomplete pictogram which shows information….'; Diagram enlarged. Key moved above the diagram. Part (c) Wording added 'Complete the pictogram in the Diagram Booklet…'; for Braille provide a spare diagram and drawing film.	Standard mark scheme
13	(a)	Wording added 'A number sequence starts with the three numbers shown below.'	Standard mark scheme
13	(b)	The wording 'Here are…' removed and replaced with 'Below are…' Braille: "Here are" removed. Sentence changed to: "The first four terms of the sequence of triangle numbers are given below."	Standard mark scheme
15	(a)	*a* changed to *p*. *d* changed to *q*.	Standard mark scheme except for the letter changes indicated to give $2p + 2q$
16		Wording added 'Look at the diagram for Question 16 in the Diagram Booklet. It shows a kite *ABCD*.' And for Braille: "The diagram shows a kite, *ABCD*." Wording '*ABCD* is a kite' removed. Diagram enlarged. Part (b): Wording added 'Find the value of *x*, when $AD = 3AB$. The kite has a perimeter of 64 cm.'	Standard mark scheme
17		Wording added 'Look at the information for Question 17 in the Diagram Booklet. It shows a recipe.' Wording 'this recipe' removed and replaced with 'the recipe in the Diagram Booklet.' Information enlarged. Tracking lines added.	Standard mark scheme

PAPER: 1MA1_1F			
Question		**Modification**	**Mark scheme notes**
18		Wording added 'Look at the diagram for Question 18 in the Diagram Booklet. It shows a grid.' Wording 'below' removed. Diagram enlarged. Open headed arrows. Grid cut at y=6. Axes labels moved to the right of the horizontal axis and above the vertical axis. Braille: x y Words added: 'You may use the table if you wish…' – 2 (i) Answer lines added: 'Ans: (i) __ (ii) __ (iii) __ (iv) __ (v) __ (vi) __' – 1 (ii) Diagram enlarged to a 2 cm grid cut at y=6. 0 (iii) Spare diagram provided. 14 round bumpons and Wikki Stix. 1 (iv) 2 (v) 3 (vi)	Standard mark scheme
21		Wording added 'Look at the diagram for Question 21 in the Diagram Booklet. It shows an incomplete Venn diagram.' Wording added 'in the Diagram Booklet…'. Diagram enlarged. Labels 'Set *A*' and 'Set *B*' moved above the circles. Braille: In the diagram, add (i) for universal set, (ii) for Set *A*, (iii) for the overlap & (iv) for Set **B**. Then add 'Ans: (i) __ (ii) __ (iii) __ (iv) __'	Standard mark scheme
24		Wording added 'Look at the information for Question 24 in the Diagram Booklet.' Information enlarged.	Standard mark scheme

PAPER: 1MA1_1F			
Question		**Modification**	**Mark scheme notes**
25		Wording 'Look at Diagram 1 and Diagram 2 for Question 25 in the Diagram Booklet. You may be provided with a model.' The triangle labelled *ABC*. Diagram 1 to show the 3D prism. Diagram 2 to show the cross-section *ABC*. Wording added 'Diagram 1 and the model show a prism'. Wording added 'The cross section of the prism shown in Diagram 2 is a right-angled triangle labelled *ABC*.' Wording added 'Angle *ABC* is a right angle. The base of the triangle, *BC* = 5 cm.' Diagram enlarged. Right angle made more obvious. Dashed lines made longer and thicker. Model could be provided candidates.	Standard mark scheme
26		Model of the cube and sphere provided for all candidates. Wording added 'Look at Diagram 1, Diagram 2 and the formula for Question 26 in the Diagram Booklet. You may be provided with two models.' Wording 'The diagram shows…' removed and replaced with 'Diagram 1 and Model A show a cube with edges of length *x* cm.' Wording added 'Diagram 2 and Model B show a sphere of radius 3 cm.' Diagrams enlarged and stacked vertically. Dashed lines made longer and thicker. The '3 cm' label and arrow moved to the left on the sphere diagram. Formula moved above the surface area diagram. Open headed arrows.	Standard mark scheme

8	(a)	3, 2	B1	cao	
	(b)	Point at (−4, 3)	B1	cao	
	(c)	Circle drawn, centre (1, −1)	B2	fully correct diagram	Allow reasonable hand-drawn attempts
			(B1	circle drawn with radius 4 cm (any centre) **or** circle drawn using centre (1, −1) $r \neq 4$ cm)	

Paper: 1MA1/2F

Paper: 1MA1/2F

Question	Answer	Mark	Mark scheme	Additional guidance
25	14.5, 21	P1	for process to work with coordinates, eg 4 – (−3) (= 7) **or** 9 – 1 (= 8)	Accept in reverse order eg −3 − 4 (= −7) and negative distances throughout
		P1	for process to use ratio, eg "7" ÷ 2 (= 3.5) **or** "8" ÷ 2 (= 4) **or** "7" × 3(= 21) **or** "8" × 3 (= 24)	This mark is implied by 10.5 or 12 or 17.5 or 20
		P1	for complete process to find either the x or the y coordinate of N, eg "3.5" × 3 + 4 or "4" × 3 + 9 or "3.5" × 5 –3 or "4" × 5 + 1 **OR** to find both the required distances eg "3.5" × 3 (= 10.5) **and** "4" ×3 (= 12) **or** "21" ÷ 2 (= 10.5) **and** "24" ÷ 2 (= 12) **or** "3.5" × 5 (= 17.5) **and** "4" × 5 (= 20)	
		A1	oe	

Question	Answer	Mark	Mark scheme	Additional guidance
15	−0.5, 1	M1	for one correct coordinate **or** midpoint shown on diagram **or** correct method, eg $\frac{-3+2}{2}$ or $\frac{-2+4}{2}$ **or** for the coordinates reversed, eg 1, – 0.5	
		A1	for −0.5, 1 oe	

24	(a)	4	B1	for 4	Condone (0,4) or 0,4
	(b)	(3, −5)	B1	cao	
	(c)	5.1 to 5.3 and 0.7 to 0.9	M1	for a correct method, eg marking both intercepts with *x*-axis **or** one correct solution	**Accept** both solutions given as a coordinate for M1 eg (5.2, 0.8) **or** (0.8, 5.2) **or** (5.2, 0) **and** (0.8, 0)
			A1	for answers in the range 5.1 to 5.3 and 0.7 to 0.9	

Question		Answer	Mark	Mark scheme	Additional guidance
9	(a)	(–1,2)	B1	cao	
	(b)	(1 ,4) marked	B1	for the point (1, 4) unambiguously marked on the grid	need not be labelled if clear
	(c)	$y = -3$ shown	B1	for correct line unambiguously marked	need not be labelled if clear accept a line drawn freehand

Question	Answer	Mark	Mark scheme	Additional guidance
9 (a)	(5, 2)	B1	cao	
(b)	(4, −2) marked	B1	for the point (4, −2) unambiguously marked on the grid	Allow without label, provided unambiguous
(c)	(1, 3)	B1	cao	
(d)	$y = -4$ shown	B1	for correct single line unambiguously marked	Need not be labelled if clear. Accept a single line drawn freehand of any length. Accept a dotted (or dashed) line

26	(a)	(1, –3)	B1	cao	
	(b)	−0.7 or 2.7	B1	for an answer in the range –0.8 to –0.6 **or** 2.6 to 2.8	

Paper: 1MA1/3F

Question	Answer	Mark	Mark scheme	Additional guidance
25 (a)	$y = \frac{3}{2}x + 3$	M1	for a correct method to find the gradient of the line, eg $\frac{6-3}{2-0}$ $(=\frac{3}{2})$ **or** identifies 3 as the intercept in words or in a partial equation **or** for $y = [\frac{3}{2}]x + c$ **or** for $y - b = [\frac{3}{2}](x - a)$ where (a, b) is a correct coordinate	Just circling 3 is insufficient $[\frac{3}{2}]$ must be identifiable as their gradient c must be seen either as a letter or a number
		M1	for $y = \frac{3}{2}x$ $(+ c)$ oe **or** for $y =$ "$\frac{3}{2}$"$x + 3$, $m \neq 0$ **or** (**L** =) $\frac{3}{2}x + 3$ **or** $y - y_1 = \frac{3}{2}(x - x_1)$ **or** $y - b =$ "$\frac{3}{2}$"$(x - a)$ where (a, b) is a correct coordinate	Award of this mark implies the first M1
		A1	oe	Any correct equation gets 3 marks
(b)	Equation	B1	for $y = 5x + c$, $c \neq 0$ oe	May be in any equivalent form

Paper: 1MA1/1F

Question	Answer	Mark	Mark scheme	Additional guidance
8 (a)	2, 1	B1	cao	
(b)	0, – 2	M1	for an answer of $(0, y)$ where $y \neq -2$ or $(x, -2)$ where $x \neq 0$ **or** the correct midpoint identified on the grid **or** $(2 + -2) \div 2$ or $(1 + -5) \div 2$	
		A1	cao SCB1 if M0 scored for – 2, 0	
(c)	*C* shown at (– 4, 2)	C1	cao	

8	(a)	(3, 1)	B1	cao	
	(b)	*B* at (3, – 4)	B1	cao	Accept a cross without label as long as unambiguous. Accept letter B or dot in place of cross.
	(c)	(0, 2)	B1	cao	

Paper: 1MA1/1F

24	Rate of change of volume	C1	for a correct explanation **Acceptable examples** The rate of water poured Speed of pouring water out from the tank How fast the water is being used (in the tank over time) Amount of water decreasing in the tank each second **Not acceptable examples** Negative correlation / negative gradient Amount of water decreasing in the tank in seconds As time increases the volume of water in the tank decreases It is negative, the volume of litres is going down It represents the deceleration or changing speed	Allow amount of water increasing in the tank each second

Paper: 1MA1/1F

21	(a)	(2),–2,(–4), –4, –2, 2	B2 (B1	for all 4 values correct for 2 or 3 correct values)	
	(b)	Graph drawn	B2 (B1	for a fully correct graph ft (dep on B1 in (a)) for plotting at least 5 of the points from their table correctly)	Accept a freehand curve drawn that is not made of line segments Curve must not have a horizontal segment between $(-1, -4)$ and $(0, -4)$ Ignore anything drawn outside the required range
	(c)	– 0.5, – 4.25	B1	ft their graph with a single turning point or for *x* coordinate = – 0.5 and *y* coordinate = – 4.25 oe	

Paper: 1MA1/1F

9	(a)	–2, 1	B1	cao	
	(b)	Point marked at (1, 2)	B1	cao	Accept without label provided unambiguous, ignore any lines drawn
	(c)	Point marked at (5, 0)	B1	cao	Accept without label provided unambiguous, ignore any lines drawn

Paper: 1MA1/3F

Question	Answer	Mark	Mark scheme	Additional guidance
28	(11, 14.5)	P1	for process to work with coordinates, eg 8 – 2 (= 6) **or** 12 – 7 (= 5) **or** eg (2 + 8) ÷ 2 (= 5) **or** (7 + 12) ÷ 2 (= 9.5)	Working may be seen on the diagram Allow alternative notation eg (6, 5) or (5, 6) or (5, 9.5) or (9.5, 5) Implied by $\frac{.....}{8-2}$ or $\frac{12-7}{.....}$ even if using $\frac{\text{diff in } x}{\text{diff in } y}$
		P1	for process to use proportion, eg "6" ÷ 2 (= 3) oe **or** "5" ÷ 2 (= 2.5) oe **or** 2 + "6" × 1.5 (= 11) **or** 2 + 9 (= 11) oe **or** 7 + "5" × 1.5 (= 14.5) **or** 7 + 7.5 (= 14.5) oe **or** "5" + "6" (= 11) **or** 8 + "5" – 2 (= 11) oe **or** "9.5" + "5" (= 14.5) **or** 12 + "9.5" – 7 (= 14.5) oe **or** (11, a) where $a \neq 14.5$ **or** (b, 14.5) where $b \neq 11$	Allow alternative notation eg (3, 2.5) or (2.5, 3) Implied by 8 + "3" (= 11) or 12 + "2.5" (= 14.5) Award P2 for (14.5, 11)
		A1	for (11, 14.5) oe	

Paper: 1MA1/3F

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Mark Scheme (Results)

March 2013

GCSE Mathematics (Linear) 1MA0
Foundation (Calculator) Paper 2F

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NOTES ON MARKING PRINCIPLES

1 All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.

2 Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.

3 All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

4 Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

5 Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

6 Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labeling conventions.

ii) *select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

7 With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.
If there is no answer on the answer line then check the working for an obvious answer.
Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.
If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

8 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.
Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

9 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect cancelling of a fraction that would otherwise be correct
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.
Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

PMT

10 Probability

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.
If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

11 Linear equations

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

12 Parts of questions

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

13 Range of answers

Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

Guidance on the use of codes within this mark scheme
M1 – method mark A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent isw – ignore subsequent working

PMT

1MA0_2F					
Question		**Working**	**Answer**	**Mark**	**Notes**
1	(a)		7025	1	B1 cao
	(b)		Nine thousand four hundred (and) fifty	1	B1 for Nine thousand four hundred (and) fifty Accept 'nine thousand' written as '9 thousand', 'four hundred' written as '4 hundred' and 'fifty' written as '5 tens' or any mixture of these. Do not penalise poor spelling.
	(c)		29	1	B1 for 29 or twenty nine or 29.0
	(d)		7000	1	B1 for 7000 or 7 thousand or seven thousand
2	(a)		8, 10	1	B1 cao
	(b)		24	1	B1 cao
	(c)		reason	1	B1 for a valid reason that demonstrates the understanding that the number of triangles is twice the pattern number
3	(a)		240	1	B1 for 240
	(b)		arrow at 125°C	1	B1 for arrow (or line) pointing within a range of 122.5 to 127.5 (ie nearer to 125 than either 120 or 130) Use professional judgement.
	(c)		6.05 (pm)	1	B1 for 6.05 (pm) oe

1MA0_2F					
Question		**Working**	**Answer**	**Mark**	**Notes**
4	(a)		Thursday	1	B1 cao
	(b)		7	1	B1 cao
	*(c)		Nick	3	M1 for the intention to add Dave's 4 times or Nick's 4 times A1 for 58 and 64 C1 (dep on M1 and two totals) for clearly stating Nick as their answer or ft from their two totals OR M1 for the intention to find the difference between the times on each of the 4 days A1 for 6 or −6 C1 (dep on M1 and a net difference) for clearly stating Nick as their answer or ft from their difference [SC: B1 for "Nick spent 6 minutes more than Dave on his phone" if M0 scored.]
5			9 squares shaded	1	B1 for any 9 squares shaded oe
6			66	2	M1 for a correct method to find the number of people on the bus if the 15 get off first. (= 57) A1 cao OR M1 for a correct method to find the number of people on the bus if the 9 get on first. (= 81) A1 cao OR M1 for a correct method to find the net change in the number of people on the bus (= 6 or −6) A1 cao

1MA0_2F					
Question		**Working**	**Answer**	**Mark**	**Notes**
7		20 − 6.65 13.35 ÷ 3	4.45	3	M1 for a correct method to find the amount shared by B, R and T M1 (dep) for a correct method of dividing this amount by 3 A1 cao [SC: B1 for an answer of 17.78 (20 – 6.65 ÷ 3), if M0 scored, with or without working]
8	(a)		3, 6, 9, 3	3	B3 for a table showing all 4 correct frequencies in the correct place. (condone the absence of or any incorrect tallies) [(B2 for 2 or 3 correct tallies or 2 or 3 correct frequencies even in the wrong columns) (B1 for 1 correct tally or 1 correct frequency even in the wrong column)] [SC: B2 for 3/21 and 6/21 and 9/21 and 3/21 shown in the frequency column]
	(b)		3	1	B1 for 3 or ft table in (a)
9			Circle radius 5 cm drawn	1	B1 for a circle of radius 5 cm drawn (condone an alternative centre)

PMT

1MA0_2F					
Question		**Working**	**Answer**	**Mark**	**Notes**
10	(i)		5,15 or 5,125 or 15,125 or 30,50 or 30,60 or 30,90 or 30,100 or 50,60 or 50,90 or 50,100 or 60,90 or 60,100 or 90,100	4	B1 for 2 numbers, from the list, whose sum is an even number.
	(ii)		60 or 100		B1 for 60 or 100 or both
	(iii)		5 or 15		B1 for 5 or 15 or both
	(iv)		125		B1 cao
11		9.39 × 10 24.30 × 3 + 9.39 93.90 − 82.29	£11.61	5	M1 for a correct method to find the most expensive way to buy the 10 cartridges (= 93.90) M1 for a correct method to find the least expensive way to buy the 10 cartridges (= 82.29) M1 (dep on M1 scored) for a correct method to find the difference between their least and their most expensive way, provided that both totals are for the cost of exactly 10 cartridges A1 for 11.61 B1 (indep) for correct units

PMT

1MA0_2F					
Question		**Working**	**Answer**	**Mark**	**Notes**
12	(a)(i)		B and D	2	B1 cao
	(ii)		G and E		B1 for G and E (allow B and D if not in (i))
	(b)	3 + 3 + 3 + 2 + 2 +1 + 1 + 1	16	1	B1 cao
13	(a)		6am	1	B1 for 6am (accept −4) Do not accept 6 alone.
	(b)		3	1	B1 for 3 (allow − 3)
	(c)	−1−5	−6	2	M1 for −1 − 5 or intention to subtract 5 from -1 (may be shown on a diagram) A1 cao

1MA0_2F					
Question		**Working**	**Answer**	**Mark**	**Notes**
*14			Yes + supporting work	4	M1 for adding the weights of all the ingredients (= 96) M1 (dep) for '96' × 8 A1 cao for 768 C1 (dep on M2), ft for a correct conclusion (yes or no) from a comparison of 750 (pots) with their '768' pots; units must be quoted [SC: B1 for 768 seen without working if M0M0 scored] **OR** M1 for adding the weights of all the ingredients (= 96) M1 for 750 ÷ 8 A1 cao for 93.75 C1(dep on M2), ft for a correct conclusion (yes or no) from a comparison of their weight of ingredients in one tank full '93.75' kg with '96' kg; units must be quoted [SC: B1 for 93.75 seen without working if M0M0 scored]] **OR** M1 for adding the weights of all the ingredients (= 96) M1 (dep) for 750 ÷ '96' A1 cao for 7.8125 C1(dep on M2), ft for a correct conclusion (yes or no) from a comparison of their number of pots, '7.8125' pots with 8 (pots); units must be quoted [SC: B1 for 7.8125 seen without working if M0M0 scored]]
15			85 29 54 **168** **93** 31 47 171 13 5 **9** **27** 191 **65** **110** 366	3	B3 for fully correct table (B2 for 3 or 4 or 5 correct entries, B1 for 1 or 2 correct entries)

PMT

1MA0_1F					
Question		**Working**	**Answer**	**Mark**	**Notes**
16	(a)(i)		5	3	B1 cao
	(ii)		8		B1 cao
	(iii)		5		B1 cao
	(b)		correct sketch	2	B2 for fully correct sketch [B1 for a square (or rectangle) drawn with 2 or 3 connecting triangles on the outside of the square]
17	(a)(i)		12.978(61279…)	2	B1 for 12.978(…..)
	(ii)		13		B1 for 13 or ft from a(i) [Note: An answer of 13.0 gets B0]
	(b)		100000	1	B1 cao
18	(a)	$2 \times 8 = 16$ $16 + 7$	23	2	M1 for correct substitution of 8 into the expression $2f$ A1 cao
	(b)	$3 \times -2 + 5 \times 4$	14	2	M1 for correct substitution into the formula A1 cao

PMT

1MA0_2F					
Question		**Working**	**Answer**	**Mark**	**Notes**
19	(a)		$\frac{40}{360}$	1	B1 for $\frac{40}{360}$ oe (ignore any incorrect simplification) Accept 0.11…. if no fraction shown
	(b)		4	3	M1 for a correct method to find the angle of the 'weeding' sector If measured, accept an angle between 138 and 142 inc. M1 (dep) for a correct method to find the number of degrees per hour (= 20) or the number of hours ($\frac{1}{20}$ (3 mins) per degree A1 cao for 4
20	(a)		2.5	2	M1 for 10 (cm) or "10" ÷ 4 A1 for 2.45 – 2.55
	(b)		A marked on diagram	2	M1 for a point marked (or line drawn) on a bearing of 038° from either point B or point W, OR for a point marked (or arc drawn) 6 cm from B A1 for the position of Avebury marked (accept without label if not ambiguous)

PMT

1MA0_2F					
Question		**Working**	**Answer**	**Mark**	**Notes**
21	(a)		30	1	B1 for 30 minutes oe
	(b)		20	1	B1 cao
	(c)		graph completed	2	B1 for horizontal line from (5, 20) to (5.30, 20) B1 for a single straight line with the correct gradient from '(5.30, 20)' to the time axis
22	(a)		$x = 3$ drawn	1	B1 for $x = 3$ drawn [Note: each line drawn must be a single line segment satisfying $x = 3$]
	(b)		$y = x$ drawn	1	B1 for $y = x$ drawn [Note: each line drawn must be a single line segment satisfying $y = x$]
	(c)	Gradient = $\frac{3-0}{0--2}$	1.5	2	M1 for a method to find the gradient of the given line A1 for 1.5 oe
23	(a)		n^8	1	B1 for n^8 (accept n^{5+3})
	(b)		n^5	1	B1 for n^5 (accept n^{7-2})

PMT

1MA0_2F					
Question		**Working**	**Answer**	**Mark**	**Notes**
24	(a)	15 ÷ 6	2.5	2	M1 for 15 ÷ 6 oe A1 for 2.5 or $2\frac{1}{2}$
	*(b)		Yes + evidence	2	M1 for a correct method to change 15 miles into kilometres C1(dep on M1) for 24 km **and** statement with correct conclusion [SC: B1 for "Yes" oe and 24 km shown if M0 scored] **OR** M1 for a correct method to change 20 kilometres into miles C1(dep on M1) for 12.5 miles **and** statement with correct conclusion [SC: B1 for "Yes" oe and 12.5 miles shown if M0 scored]

1MA0_2F					
Question		**Working**	**Answer**	**Mark**	**Notes**
25			414.96	5	M1 for a correct method to work out the amount of oil required to fill the tank M1 for a correct method to find the cost of oil required before the discount M1 for a correct method of finding 5% of their calculated cost M1 (dep on previous M1) for a correct method to find the discounted cost A1 for correct answer of 414.96 or 41496p **OR** M1 for a correct method of finding 5% of the cost of 1 litre of oil M1 (dep on previous M1) for a correct method to find the discounted cost of 1 litre of oil M1 for a correct method to work out the amount of oil required to fill the tank M1 for a correct method to find the discounted cost of the oil required A1 for correct answer of 414.96 or 41496p **OR** M1 for a correct method to work out the amount of oil required to fill the tank M1 for a correct method of finding 5% of their calculated amount of oil M1 (dep on previous M1) for a correct method to find the reduced amount of oil M1 for a correct method to find the cost of the reduced amount of oil A1 for correct answer of 414.96 or 41496p

PMT

1MA0_2F					
Question		**Working**	**Answer**	**Mark**	**Notes**
26	(a)	$1 - 0.2 - 0.1$ $0.7 \div 2$	0.35	3	M1 for correctly using total probability 1 or 100% if percentages used M1 (dep) for complete correct method to complete the solution A1 for 0.35 or 35% or $\frac{35}{100}$ oe
	(b)	0.1×200	20	2	M1 for 0.1×200 A1 cao [SC: B1 for an answer of $\frac{20}{200}$ if M0 scored]
27	(a)		$3x + 12$	1	B1 for $3x + 12$ or $12 + 3x$
	(b)		$x^3 + 2x$	2	M1 for the intention to multiply both terms in the bracket by x A1 for $x^3 + 2x$ OR B2 for $x^3 + 2x$ [B1 for x^3 or $2x$ seen]
	(c)		$x(x - 6)$	1	B1 for $x(x - 6)$ or $(x - 6)x$

PMT

1MA0_2F					
Question		**Working**	**Answer**	**Mark**	**Notes**
28			1180	3	M1 for a correct method to find the area of the cross section M1 (dep) for a complete correct method for the volume of the prism A1 cao OR M1 for a correct method to find the volume of one cuboid M1 (dep) for a complete correct method for the volume of the prism A1 cao

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Question 29

This question was not well answered. There were some blank responses seen. It is not clear if the terms ‘turning point’ or ‘roots’ were understood by some students.

Part (a) was usually correct or blank.

Many who gave answers to part (b) stated all the intercepts with both axes or tried to give coordinate solutions. A few students tried to solve the quadratic algebraically, usually unsuccessfully.

Summary

Based on their performance on this paper, students should:

- take care when carrying out arithmetic operations, checking answers to avoid careless errors
- set out working clearly for all questions, particularly those with three or more marks
- practice answering ‘explain’ and ‘give a reason for your answer’ type of questions
- practice working with questions involving the speed-distance-time formula and working in

fractions of an hour and decimal equivalents of time

Question 10

There were many fully correct answers to this question but also many students who scored one mark for plotting the point correctly in part (a) of the question but in part (b) wrote down $(0, -1)$ instead of the correct $(-1, 0)$ for the coordinates of the midpoint of BC.

Question 8

In parts (a) and (b), failure to score full marks was usually a result of reversing the coordinates. Similarly, in part (c) the most common error was to plot the required point at (1, -2). Many students failed to label their chosen point, but if correctly and unambiguously plotted, the mark was awarded.

Question 29

This single mark question was not well answered. The vast majority of students were unable to pick out the value of the gradient from this simple equation.

Summary

Based on their performance on this paper, students should

- read questions carefully
- practise answering questions involving negative numbers
- always attempt questions as part marks are available for suitable starting points.

Question 28

In this cohort, very few students showed any understanding of $y = mx + c$
Closest attempts were 3 or 4 in part (a) and (3, 4) or (3, -4) in part (b).

Summary

Based on their performance on this paper, students should:

- show clear, ordered working for all questions
- show full working if using a build up method for finding a percentage of an amount
- practice long multiplication and long division of decimal values
- ensure that they read the question carefully and so provide the answer required by the question

Question 8

As to be expected part (a) was well answered with most students able to give the correct coordinates for the point shown.

The second part of this question was also very well answered with the majority of students gaining the mark for demonstrating the ability to plot the pair of coordinates accurately. The most common error seen was to transpose the values and plot the point as $(3, -4)$ or use the incorrect positive or negative version of one or both coordinates. Students usually marked the point clearly with a cross but many failed to label the point. Students are reminded to read the instructions given in questions carefully.

In part (c) a wide variety of answers were seen with varying levels of success; some students did not attempt to draw a circle. A good number of students did not have a pair of compasses and drew a freehand circle. Many students had the centre of the circle as (-1,1) and this gained one mark providing the radius was still 4 cm. Several students drew circles at the correct centre but with an incorrect radius, this gained one of the two marks available.

Centres could significantly improve the success rate of this question by ensuring students are

both correctly equipped and have had opportunity to practice using all necessary equipment as part of their exam preparation.

Question 25

This was another question that was not well answered. The majority of students did not understand the need to work out distances using the coordinates given in the question. Both positive and negative values were accepted for these distances. There were many students who gave the answer of (11,17) implying that the differences of 7 and 8 were correctly calculated and added on to (4,9). However, in most of these responses, there was no working shown. When working was shown, students often tried to draw axes and plot points. The use

of a diagram did allow some students to progress though this question and there were a small number of students who managed to find the y-coordinate.

Question 24

This question was completed with varying degrees of accuracy. It was rare to give full marks for all parts of the question but many students scored 1 or 2 marks within different parts of the question.

Part (a) was probably answered most, although it was clear that some students did not understand what was being asked as there were a large number of incorrect responses. Some students understood how to identify the y intercept and wrote their answer expressed as a co-ordinate, which was accepted.

In part (b) some blank scripts were seen and it was disappointing to see a significant number the coordinates written in reverse i.e. (– 5, 3) suggesting that the term turning point was understood but the order of the coordinates was the stumbling block.

For part (c) there were a large number of blank responses. When the right number was there it was often in the form of a coordinate. Only a handful of responses gained 1 mark for marking the roots on the graph. It is clear that many did not understand the meaning of ‘root’ of an equation.

Centres would benefit from reminding students to mark all key points on the diagram. If mistakes are made method marks may still be awarded.

Question 9

Candidates were well practiced with coordinates, and only a few failed to gain the marks in both part (a) and part (b), usually by reversing the coordinates.
In contrast, it was rare to see a correct answer in part (c). Frequently the y axis (and sometimes the x-axis) was often just marked with a cross. Drawing $x = -3$ was a common incorrect answer, although many candidates felt it needed to be a diagonal line, often going through point B. Another common error was to draw a line through A and B.

Question 9

Parts (a), (b) and (c) were usually answered correctly. Failure tended to be when students reversed the *x* and *y* coordinates. Some candidates drew multiple points and were not

awarded any marks in (b). They need to be reminded to label points when requested. Part (d) was poorly done, many just labelling the point $(0, -4)$ or drawing the line $x = -4$, thinking it had to be parallel to the y-axis. Weaker students often joined the point $(0, -4)$ to A or B or their C.

Question 26

Most candidates answered part (a) correctly. Some wrote the x and y coordinates the wrong way round, and a few listed the roots, which should be the answer for part (b)
Part (b) was poorly answered with most candidates leaving the question blank or writing different numbers between -2 and 3 that were not within the required range. Common mistakes included writing in co-ordinate form. even when they had the correct figure. Some students wrote -2, the intercept on the y axis, or tried to isolate x and solve the equation using algebra, not noticing they are asked to estimate by using the graph. A common incorrect

answer was (−2,2). The proportion of blank answers shows that many candidates were poorly prepared and did not understand how to find roots from a quadratic graph.

Question 25

In part (a) of this question candidates were asked to find the equation of the line shown. This was answered poorly by the majority of candidates and a significant minority did not attempt the question. Where candidates did attempt to answer the question it was unusual to see a fully correct equation for the line L. Many candidates drew a triangle under the line as a first step to calculating the gradient but then didn't know how to progress from there. A greater number of responses correctly identified the y-intercept as 3 or used the correct structure for the equation of a line, $y = mx + c$ which were awarded 1 mark. Common incorrect answers included giving coordinates, often (2, 6) which was the closest point on the line to the letter L or (-2, 3) which was obtained from the intercepts with the axes. Where equations of lines were attempted they often made use of the values -2, 3, 2 or 6 combined with the variables x and y, for example $y = 6x$ or $3y = -2x$.
In part (b) candidates were asked to write down the equation of a straight line parallel to $y = 5x$. There were a minority of candidates who were able to give a correct equation. A significant proportion of candidates did not attempt the question. Where attempts were seen, common incorrect responses included $y = -5x$, $5y = x, y = x + 5, y = kx$ with $k \neq 5$, simply restating the original equation $y = 5x$, a coordinate or a numerical value.

Question 8

Many students were able to write down the required coordinates in part (a) and a similar level of success was seen when plotting the point in part (c). When the mark wasn't awarded in part (a), it was often due to writing the x and y coordinates round the wrong way and often led to the answer to part (c) being plotted incorrectly at $(2, -4)$ instead.

Success in part (b) was not as frequent however, still a majority gained the mark nonetheless. The most successful approaches to finding the midpoint of AB often appeared to be when the two points were joined and often led to either full marks or 1 mark being awarded. When only the method mark was awarded it was often for either transposing the x and y coordinates or for marking the midpoint on the grid. Other common errors included the exclusion of the negative sign for the y coordinate, stating $x = 0$ and $y = -2$ or giving the coordinates of point B due to not reading the question carefully.

Question 8

In part (a) of this question learners were asked to give the coordinates of the point marked. The majority of learners were able to correctly identify these as (3, 1). The most common incorrect answer was (1, 3) where the x coordinate and y coordinate were reversed.

Part (b) required learners to plot the point $(3, -4)$ on the grid. This was again correctly completed by the vast majority of learners. The most common incorrect response was to plot the point $(-4, 3)$, although some learners also plotted points that were close to the required point but out by one grid square either horizontally or vertically. Occasionally learners plotted both $(3, -4)$ and $(-4, 3)$ giving a choice of answers which was not awarded the mark.

Part (c) required learners to write down the coordinate of the midpoint of AC. This was answered correctly by slightly fewer learners than part (a) and part (b), but was still answered correctly by the majority. It was common to see learners using the diagram to find the required midpoint, often by drawing a line between A & C, and successfully giving the answer (0, 2). Incorrect answers included reversal of the order of the x and y coordinates. A minority of learners had attempted to find the midpoint of AC on the diagram but had not done so successfully, others had incorrectly attempted to find the midpoint of AB. It was unusual to see a response that suggested that the learner did not understand what a midpoint was.

Question 24

This question was very poorly answered with few learners able to give an explanation that related to rate of change of volume. Incorrect answers often described the relationship between the volume and time rather than interpreting the gradient, for example 'as time increases the volume of water in the tank decreases' or 'negative correlation'. Others incorrectly described the change over a number of seconds or referenced specific values from the graph.

Question 21

In this question learners were working with a quadratic equation in what was a fairly standard question. In part (a) they were asked to complete the table of values for the given equation, in part (b) to draw the graph and in part (c) to write down the coordinates of the turning point of the graph.

Some learners were confident in the method required to find the missing values for the table – substituting the given x values in order to find the corresponding y values. Common errors when attempting substitution were errors in dealing with working with the negative number (-2), particularly when squaring, or in working with the 0. Some learners did not attempt substitution. Others tried to complete the missing values by looking for a pattern in the table which would have been successful in a table of values for a linear equation with equally spaced x coordinates, but did not work in the case of the quadratic equation in this question.

In part (b) learners generally demonstrated understanding of how the table of values related to drawing the graph required, as was evidence by plotting of their points. Provided 1 mark was awarded in (a) then a follow through was awarded in (b) for correctly plotting their points. Where learners did not have a correct table of values in (a) this often led to a curve which did not have the expected parabolic shape, however it appeared that many learners were not aware of the shape of the quadratic curve and so did not identify this as an issue.

After plotting their points, most went on to join their points with a smooth curve which gained both marks if the correct points had been plotted. Curves with a flat bottom (between $(-1, -4)$ and $(0, -4)$) were a common error. Some learners who plotted correct points were inaccurate when joining this with a curve, missing some of their points entirely. Only a small proportion of those who attempted to join the points with a curve utilised line segments.

In a very small number of cases learners who did not complete the table of values in (a) plotted a correct curve in (b) which was awarded the marks.

Part (c) of the question asked for the coordinates of the turning point of the curve. Learners who had a curve in (b) were often able to identify the coordinates of their single turning point

and gain the mark here. Common errors were inaccuracy in reading the coordinates or for omitting a negative sign (commonly on the x-coordinate). In some instances it was not possible to award the mark here as there was not a single turning point in (b) due to the shape of the graph shown. Some learners attempted this part of the question but did not have a graph with a single turning point plotted in (b) so would only have been able to gain credit for the correct turning point of the quadratic graph which could be obtained by calculation, however this was not seen.

Question 9

In part (a), B1 was awarded for a response of (−2, 1). The most frequent incorrect response was (1, −2).

In part (b), B1 was awarded for marking point *D* at (1, 2) with a cross (×). Labelling was not required, provided there was no ambiguity, such as *D* being marked elsewhere on the grid. Some leniency was applied where the cross was not placed exactly at (1, 2); if this was the nearest point to the cross, the mark was awarded. The most common incorrect response was marking (2, 2).

In part (c), B1 was awarded for marking point *E* at (5, 0) with a cross (×). As with part (b), labelling was not required if the intended point was clear. Leniency was applied for placement near (5, 0), with the mark awarded if this was the closest point. Common incorrect responses included (5, 1) and (6, 0).

Question 28

The most common fully correct method involved calculating the differences between the x-coordinates (6) and y-coordinates (5), dividing these by 2 to get 3 and 2.5, and then adding these to the coordinates of point B to give the final answer of (11, 14.5).
Two marks were awarded where one coordinate was correct, most often 11. One mark was awarded in two main ways: either by identifying the differences between coordinates (e.g. 6 and 5), which needed to be presented as a pair such as (6, 5) or (5, 6) if no working was shown; or by calculating the midpoint of AB as (5, 9.5), with one correct value and a clear process sufficient for P1.

Responses that started from the midpoint often did not progress further to find the coordinates of point C. Some responses gained P2 only, due to reversing the coordinates and giving (14.5, 11) as the final answer.



Examiners' Report
Principal Examiner Feedback

November 2022

Pearson Edexcel GCSE (9 – 1)
In Mathematics (1MA1)
Foundation (Non-Calculator) Paper 1F

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GCSE Mathematics 1MA1
Principal Examiner Feedback – Foundation Paper 1

Introduction

The paper offered an opportunity for students of all abilities to demonstrate their understanding of a variety of mathematical concepts.
The early questions acted as a good confidence building way into the paper, with many students gaining a good proportion of the early marks.

Lack of careful reading of some of the questions was a cause for concern; particular ones are quoted in the summary below. Also worrying is the number of arithmetical errors that featured in many students' work. Simple application of the four rules was found wanting on many occasions. For example, 10000/8 being seen as 8/10000. Students should be encouraged to check working before being totally satisfied with their answers.

Some students were clearly avoiding tackling questions that involved algebraic techniques. These attempted trial-and-error methods from quite early on in the paper, even for the simpler questions where an algebraic approach was straightforward.

The quality of handwriting from some candidates made their responses difficult to read. Students are advised to avoid rushing through their work.

Areas of the curriculum that need more attention are, Geometric reasoning (Q9b), Describing transformations (Q11), Equation of a straight line (Q11bii), Fractions (Q20), Indices (Q21) Comparison of ratios (Q24) and Factorisation of polynomials (Q26b).

Again, it was pleasing to see many students clearly showing their working and utilising their communication skills when required. This continues to be an area of improvement.

Report on individual questions

Question 1. This first question was generally well answered and served as a good introduction to the paper. Correct answers of $\frac{3}{10}$ or $\frac{30}{100}$ were the most common.

Question 2. This question was usually answered correctly although an answer of 6 (3×2) was a common mistake.

Question 3. Another well answered question with few mistakes. It was pleasing to see most able to follow the correct order of operations.

Question 4. Although 10 and/or 12 were seen more often than not, a number of students failed to gain the mark by offering extra, incorrect values. 6 being the most common seen.

Question 5. Many students failed to score in this question by not simplifying the given expression fully. $3w \times 5t$ and $15 \times wt$ were popular partial simplifications gaining no marks.

Question 6. It was very pleasing to see so many students gaining good marks on this multi-step question. The vast majority gaining 2+ marks. In general, marks were lost through not reading the question carefully. Often just one child was considered, or two adults were included. Another common mistake was to omit the cost of petrol while in other cases it was seen as a cost for each person. Poor arithmetic often denied many full marks, mainly with the addition of two child tickets (the only non-integer), or with an inability to line up integers and non-integers successfully in a column addition method. Some gave the total cost of the trip instead of the change.

The standard of presentation of answers was lacking, in some cases, with little structure or order to what they were doing

Question 7. Part (a) was answered well, the vast majority clearly understanding the concept of mode. In part (b) also, understanding of probability scales and probability in general was good. In (ii), some simply added a cross to the probability scale, failing to quote the actual numerical probability; this gained no marks. Some students are still using terms such as unlikely in terms of describing probability.

Question 8. Part (a) was answered well, with very few failing to score the mark. Candidates performed less well in part (b) with many not collecting the like terms of $3n$ and n together as a first step. Many tried to subtract the n from both sides of the equation either resulting in $2n = 24$ (giving $n = 12$) or $3n = 24$ (giving $n = 8$). In this question, students usually scored no marks or full marks. Some used an embedded solution, with mixed success. Many candidates who achieved full marks did not attempt the algebraic approach and instead simply stated that $3 \times 6 + 6 = 24$, with a correct answer on the answer line.

Question 9. Part (a) was well answered with the vast majority subtracting 70 from 360 to get a correct answer of 290°. However, a great many were unable to give a correct reason for this answer in part (b). The most common incorrect explanation related to a circle "having 360°". Students need to be made aware that such an explanation is not acceptable. Many simply explained how they did it, rather than why e.g. "I subtracted 70 from 360". Students should be reminded that a calculation is not a reason.
In this case "angles at a point sum to 360°" or words to that effect is the reason required.
A common incorrect approach was to work with 180° rather than 360°.

Question 10. Most students correctly worked out that 5 was the greatest number of jars of coffee that could be bought for £23 in part (a). In part (b), a large number of candidates lost the mark as they hadn't read the question carefully enough, missing the word "exactly" in reference to the number of jars to be bought at half price. Many realised that Michael could now buy an extra 11th jar but then lost the mark because they answered 'yes' to the question "Is Michael correct?".

Question 11. Whilst many students correctly wrote down the scale factor of 2 in (a)(i), only a very small minority were able to pinpoint the centre of the enlargement in (ii). Many tried to position their centre either in between the two shaded triangles, in the centre of one of the triangles or on one (or two) of the vertices. In some cases, students who were able to draw lines to intersect at the point of enlargement identified it correctly but missed the mark because they also placed 'X' somewhere else on the graph.
In part (b)(i), accurate drawing of the mirror line was good. Whilst lines drawn with a straight edge are preferred, freehand, dotted or dashed lines were acceptable. In part (b)(ii), unfortunately, very few students were able to give the equation of their line. Common incorrect lines drawn were $x = 4$ or $y = 4$, which in some cases allowed a follow through mark if they stated this as their equation for (ii).

Question 12. Again with this multi-step problem in part (a), it was pleasing to see many students gaining good marks, often 2 or more. In this question, students had to find a sixth and 20% of 120 minutes. When performing calculations of this type it is important for students to show their working, eg $120 \div 6$ or $\frac{20}{100} \times 120$ so that credit can be awarded for correct method if errors are made with accuracy. In solving this problem, some students subtracted 50 from 120 to give 70 minutes and used this as the time spent playing badminton. Arithmetic errors were seen far too often from students when subtracting from 120.
In part (b), many ignored the good work they had done in part (a) and explained that Elana did not get to the café on time because she spent 2 hours at the sports centre making it 3.30pm when she left. This part followed through the working and answer in part (a) and the mark awarded if the reason and working were correct for the time given in (a).

Question 13. Part (a) was answered correctly by the majority of students, reading 60 from the bar chart. Part (b) was answered less well when a certain amount of extrapolation was required from the chart. 210 was a common incorrect answer.
In part (c), it was evident that many students weren't able to accurately read data from a composite bar chart, many reading the number of men as 90, women 200 and children 280 in 2020. The method mark here was awarded for sight of 80 (children) or 200 (men + women) used in a ratio. Many gained this mark but failed to score full marks as a result of incorrect values read from the chart. As a result of not reading the questions correctly, some students wrote an answer of 80 (child) : 90 (men) : 110 (women).

Question 14. Greater success was achieved in part (a) of this question by finding the sum of the distance travelled in one hour (54 miles) and the distance travelled in half an hour (27 miles). It was pleasing however, to see many students correctly quoting the equation distance = speed × time to solve this problem, although accuracy was often lost through incorrect use of the units of time. 54 × 90(mins) or 54 × 1.30 were common errors made.
In part (b), very few students were able to correctly convert from centimetres to kilometres. Many gained one mark for using the scale on the map correctly, 25 000 × 6. Credit was then given for a reasonable attempt at the conversion of 150 000 cm to km, usually just dividing by 1000. Most didn't seem to be clear that they had found a measurement in cm by multiplying by 25 000, those who did include units were more likely to be able to convert correctly as they often spotted that they could convert cm to m then m to km.

Question 15. The diagram proved very useful in getting one correct coordinate, for which one mark was awarded, usually $y = 1$, but rarely was a fully correct answer seen. Whilst many students did use the diagram, drawing the correct line segment, it was also rare to see the correct positioning of the required midpoint. This was often seen placed on the y-axis. There were very few instances of candidates using written methods to find the midpoint.

Question 16. Those students who attempted an algebraic solution often picked up good marks, 2 or more, for a correct expression for the perimeter and then equating it to the given value of 52. Simplifying their algebraic expression often proved more difficult and it was not uncommon to see quadratic terms creeping in. Some students assumed all the lengths to be the same and calculated 52/4 gaining no marks.
Some students correctly found the value of x and then failed to answer the question by finding $2x$, the length of DC. Poor arithmetic let many students down in being unable to divide 57 by 6 and hence not being able to achieve the accuracy mark.
Many students did however adopt a trial and improvement approach which usually cost them a great deal of time for little reward.

Question 17. Again, understanding of probability was good and many students gained the full 2 marks in part (a). One mark was awarded for sight of 100 – 30 (= 70) or a correct value for the probability of taking a blue counter. $\frac{3}{4}$ was a common incorrect answer by some of the less able students, assuming there was an equal number of coloured counters. Students should be reminded that expressing a probability as a ratio is not an acceptable form for this answer.
In part (b), the correct answer of 45 was the modal answer, with incorrect methods following no particular pattern. A common incorrect attempt was also to try to share 30 in the ratio 2 : 3.
Part (c) followed through student's answers in (b). Explanations were usually acceptable, such that 25 counters could not be shared equally between red and yellow. It should be noted that just saying '25 can't be divided by 2' gained no credit. Also, students should be aware that any calculations given as evidence in such questions need to be accurate.

Question 18. Many students were unable to make any progress in this question by not reading the question fully and jumping in to either find a half and/or a twelfth of 240 or to divide 240 by 5, then 3 then 2. Those that correctly divided 240 in the ratio 5 : 3 : 2 usually went on to gain good marks. Many scored 3 marks for finding the numbers of cans remaining, 120, 36 and 44 but were then unable to find the required percentage of cola cans remaining. Finding one number as a percentage of another is an area that needs addressing. Those that did find a percentage were often successful by simplifying their fraction of 120/200 to 60/100.

Question 19. The factorising of 500 was usually carried out with the aid of a factor tree diagram, many of which were seen to be fully correct. Failure to gain full marks was usually down to not giving their product of prime factors as powers as requested, often just leaving the factors in a list. Many arithmetical errors in the construction of a factor tree and some misunderstandings in the concept were seen where the sum instead of a product was given. Centres should emphasise here that complete tree diagrams should have each final branch ending in a prime

Question 20. In part (a), those students who dealt with the fractions and whole numbers separately often gained greater success in achieving full marks, although an answer of $3\frac{4}{9}$ was not uncommon.
Although no credit was given for simply converting the mixed numbers to improper fractions, many did so accurately and then were able to convert both to a common denominator with at least one correct numerator to gain one mark. However, the answer following this approach was often left as an improper fraction, $\frac{77}{20}$. Unfortunately, many just added the numerators and the denominators to give an incorrect answer of $\frac{17}{9}$.
Part (b) proved to be a much greater challenge for many students, many tried to concoct means of dividing $2\frac{2}{3}$ by 6 to get $\frac{4}{9}$, a few students however correctly changed $\frac{8}{3}$ to $\frac{24}{9}$ and divided this by 6 to get $\frac{4}{9}$. The most successful approach was $\frac{8}{3} \times \frac{1}{6}$ showing an ability to divide a fraction by a whole number. Some had success by transposing the problem to show that $\frac{4}{9}$ multiplied by 6 is equal to $2\frac{2}{3}$, although $\frac{24}{54}$ was often seen.
Many students seemed to not understand the requirements for this question.

Question 21. It was clear that the rules of indices are known by many students but the application of them was very poor. $(2^{-5} \times 2^{8})$ was often written as 4^3. This had to be carefully marked as 4^3 as a final answer was an acceptable Special Case answer for one mark.
Sometimes 2^{-10} or 2^{16} were seen but rarely both.
Less able students often unsuccessfully tried to evaluate the terms before finding a product or squaring and had little understanding of negative indices. Occasionally 2^3 was seen for the method mark but this was followed by 2^5. Working with negative numbers continues to be a problem with -5+8 being evaluated as 13 or -13. Many worked exclusively with the powers and did not include the base number at all; -5 + 8 = 3 was often seen.

Question 22. It was common to see the digits 128 quoted in the working or in an answer, but rarely was the fully correct answer of 0.00128 seen. Very few seemed to know the rule of finding the product of the numbers and then counting the decimal places in order to position the decimal point. Many used long multiplication techniques, usually to no avail. It was rare to see an answer given in standard form. Method marks were sometimes gained for arithmetic errors in working but with a correctly positioned decimal place.

Question 23. This question was not answered well at all. Sampling techniques were not well understood at this level. Many either multiplied 40 000 by 80 or divided by 15. Attempts to divide 40 000 by 80 often introduced arithmetic errors, some just left 500 as their answer and those that knew to multiply by 15 struggled to do so correctly. Some students tried to work with percentages which rarely gained any credit eg 15%.
Students need to be encouraged to consider the suitability of their answers as some offered answers which were greater than 40 000, the total number of cars produced.

Question 24. Students at this level find the comparing of ratios particularly challenging. The most common error in part (a)(i) was to add the values of b in the ratios to give a triple ratio of 1 : 9 : 5 or used some of the numbers in the given ratios and gave an answer of 1 : 3 : 5. Some using a correct common multiple often spoiled their final answer by more arithmetical mistakes. Although (i) was poorly answered many picked up marks for correctly following through with their values for a, b and c in part (ii).
In part (b), few students were able to make significant progress. Those who assigned values to m, n and p were often successful, but this was rare. The substitution of $n = 2m$ into $p = 5n$ was rare also but usually successful when seen. Occasionally answers lost the accuracy mark for an incorrect order of 10 : 1 or for including letters in their final answer, eg. 1n : 10n.

Question 25. This was very poorly answered. The formula and the force both being given meant there was only the need to work out the area by multiplying 4 by 2. Some students still think that when working with area, they need to square the values first before using them to divide into 10 000. Those who correctly worked out the area usually tried to divide 10 000 by 8, for one mark, but often then failed, again through poor arithmetic. Some stated the area as 6 (4 + 2) and therefore gained no credit.

Question 26. There were many trial and improvement attempts to answer part (a) of this question, the majority of which were unsuccessful, however a few did throw up the critical value of 6. Those following an algebraic approach were able to score one mark initially for a correct process to start a solution. Subtracting 3 from both sides was usually successful but multiplying both sides by 2 was often carried out incorrectly by omitting to multiply the 3 by 2 resulting in $5x + 3 > 36$ or $5x + 3 = 36$. A correct first step was often followed by an incorrect second step or no second step at all.
Replacing the inequality by an equality is not penalised but students must remember to replace the inequality for the final answer. Far too often an answer of $x = 6$ was given.
In part (b), the ability to factorise a polynomial was sketchy. Factorisation of the first two terms [eg. $x(x + 10) + 9$] was often seen but this gained no credit.
$(x + 10)(x – 1)$ was also a common incorrect answer seen. Common incorrect answers included $(x + 1x)(x + 9)$ or $(x + 9x)(x + 1)$

Summary

On the evidence of performance on this paper, students need to:

- take greater care when reading the questions. Performance in questions 6, 10b, 12 and 18 in particular was severely affected by this.
- take care when carrying out arithmetic operations and check their working to avoid careless errors.
- write clearly so that correct values quoted are not altered in subsequent working.
- show clear methods of working particularly in basic calculations such as finding fractions or percentages of quantities.
- set their working out clearly, crossing out working that is being replaced.
- be able to convert using metric units of distance.
- be clear on the specific wording required when giving geometric reasoning

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