

Mark Scheme (Results)

November 2019

Pearson Edexcel GCSE (9 – 1)
In Mathematics (1MA1)
Higher (Non-Calculator) Paper 1H

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General marking guidance

These notes offer general guidance, but the specific notes for examiners appertaining to individual questions take precedence.

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

Where some judgement is required, mark schemes will provide the principles by which marks will be awarded; exemplification/indicative content will not be exhaustive. When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the response should be sent to review.

2 All the marks on the mark scheme are designed to be awarded; mark schemes should be applied positively. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme. If there is a wrong answer (or no 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.

Questions where working is not required: In general, the correct answer should be given full marks.
Questions that specifically require working: In general, candidates who do not show working on this type of question will get no marks – full details will be given in the mark scheme for each individual question.

3 Crossed out work

This should be marked **unless** the candidate has replaced it with an alternative response.

4 Choice of method

If there is a choice of methods shown, mark the method that leads to the answer given on the answer line.
If no answer appears on the answer line, mark both methods **then award the lower number of marks.**

5 Incorrect method

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 for your Team Leader to check.

6 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working as you can check the answer, 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.

7 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 or its context. (eg. an incorrectly cancelled fraction when the unsimplified fraction would gain full marks).
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect (eg. incorrect algebraic simplification).

8 Probability

Probability answers must be given as a fraction, percentage or decimal. 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 fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

9 Linear equations

Unless indicated otherwise in the mark scheme, full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously identified 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 (embedded answers).

10 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 all numbers within the range.

11 Number in brackets after a calculation

Where there is a number in brackets after a calculation E.g. 2 × 6 (=12) then the mark can be awarded **either** for the correct method, implied by the calculation **or** for the correct answer to the calculation.

12 Use of inverted commas

Some numbers in the mark scheme will appear inside inverted commas E.g. "12" × 50 ; the number in inverted commas cannot be any number – it must come from a correct method or process but the candidate may make an arithmetic error in their working.

13 Word in square brackets

Where a word is used in square brackets E.g. [area] × 1.5 : the value used for [area] does **not** have to come from a correct method or process but is the value that the candidate believes is the area. If there are any constraints on the value that can be used, details will be given in the mark scheme.

14 Misread

If a candidate misreads a number from the question. Eg. uses 252 instead of 255; method or process marks may be awarded provided the question has not been simplified. Examiners should send any instance of a suspected misread to review.

Guidance on the use of abbreviations within this mark scheme	
M	method mark awarded for a correct method or partial method
P	process mark awarded for a correct process as part of a problem solving question
A	accuracy mark (awarded after a correct method or process; if no method or process is seen then full marks for the question are implied but see individual mark schemes for more details)
C	communication mark awarded for a fully correct statement(s) with no contradiction or ambiguity
B	unconditional accuracy mark (no method needed)
oe	or equivalent
cao	correct answer only
ft	follow through (when appropriate as per mark scheme)
sc	special case
dep	dependent (on a previous mark)
indep	independent
awrt	answer which rounds to
isw	ignore subsequent working

Paper: 1MA1/1H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
1	1080	M1	for method to write one number as a product of prime factors (condone one division error in method chosen), eg. one complete factor tree or 2, 2, 3, 3, 3 or 2, 2 , 2, 3, 5 or for listing at least 5 multiples of either number (condone one error) or for any common multiple (≠ 1080), eg. 12960 (= 108 × 120)	Accept first 5 multiples if all correct or one error in the first 6 multiples
		M1	for method to write both numbers as a product of prime factors (condone a total of one division error) eg. two complete factor trees or 2, 2, 3, 3, 3 **and** 2, 2, 2, 3, 5 or lists of multiples of the two numbers, at least 5 of each, one of which includes 1080	For the list not containing 1080, accept first 5 correct multiples or one error in the first 6 multiples
		A1	cao SC: B2 for any product that would lead to 1080, eg. $2^3 \times 3^3 \times 5$ or 12 × 9 × 10	

Paper: 1MA1/1H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
2	2 (supported)	P1 P1 P1 A1	for a process to find the number of men, eg. (60 ÷ 2) ÷ 3 (= 10) for a process to find the number of children, eg. 60 – "30" – "10" (= 20) for a start of a process to find the value of *n*, eg. ("20" : "10") ÷ 5 or 20 : 10 = 10 : 5 or "20" ÷ "10" for 2 with supportive working	 60 ÷ 3 = 20 scores no marks Any ratio must come from correct processes to find the number of children and the number of men Award 0 marks for 2 with no correct supportive working Award full marks for 2 : 1 given as a final answer from correct supportive working
3	$2\frac{1}{3}$	M1 M1 A1	for either $\frac{7}{4}$ oe or $\frac{4}{3}$ oe for method to find the product, eg. $\frac{7\times4}{4\times3}$ or $\frac{21\times16}{12\times12}$ oe or for $\frac{28}{12}$ or $\frac{7}{3}$ oe for $2\frac{1}{3}$ or an equivalent mixed number	
4	perpendicular line constructed	C2 (C1	for a fully correct construction with all relevant arcs drawn for a perpendicular line drawn from *P* to the line *CD* or all relevant arcs drawn)	Perpendicular line segment between *P* and *CD* must be within guidelines Accept dotted lines

Paper: 1MA1/1H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
5	93	M1 M1 M1 A1	for method to find angle *ACB*, eg. 180 – 75 – 51 (= 54) (dep M1) for method to use the ratio, eg. "54" ÷ (2 + 1) (= 18) for complete method, eg. 180 – 51 – "18" × 2 or 75 + "18" oe cao	Angles may be shown on diagram but must not be ambiguous eg. M0 for angle of 54° shown in the wrong place
6	No (supported)	P1 P1 C1	for process to find total weight of the 4 red bricks, eg. 5 × 4 (= 20) **or** for process to find total weight of the 5 blue bricks eg. 9 × 5 (= 45) for process to find total weight of all 10 bricks, eg. "20" + "45" + 6 (= 71) No with correct supporting evidence **Acceptable examples** No, it is 7.1 She is wrong, it is 0.1 more No, (the total weight is) 71 not 70 **Not acceptable examples** Yes …. No, it is 71	May be seen next to statements 20 must be clearly referenced to the red bricks. 5 + 9 + 6 = 20 gets no marks Candidates working in grams will need to give 7100 and 7000 for example as comparable figures

Paper: 1MA1/1H					
Question		**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
7	(a)	p^{10}	B1	cao	
	(b)	$2x^4y^2$	M1	for any two of $12 \div 6$ (= 2), x^{7-3} (= x^4), y^{3-1} (= y^2) in a single product or written as a fraction with complete and correct cancelling of at least two terms	
			A1	cao	
8	(i)	Distance in the range 20 to 23	P1	for a process to draw a bearing of 070°, eg. a line drawn 70° from the North line at *P*	Accept a line of any length as long as the intention is clear.
	(ii)	Bearing in the range 317 to 330	P1	for a process to work out the distance *PQ*, eg. 12×1.5 (= 18)	
			P1	(dep previous P1) for the process to use the given scale, eg. "18" ÷ 4 (= 4.5 cm)	Award P3 for Q shown in the correct place on the diagram. 4.5 scores 2 marks provided there is a link to 12×1.5 (= 18)
			A1	(dep P3) for distance in the range 20 to 23	Award no marks if no supportive processes
			A1	(dep P3) for bearing in the range 317 to 330	Award no marks if no supportive processes Award A0A0 if *Q* is not in the correct place

Paper: 1MA1/1H					
Question		**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
9	(a)	21.6	M1	for a method using distance = speed × time, eg. $72 \times \frac{18}{60}$ or 7.2 km in 6 minutes, so 7.2 × 3 oe partitioning method	Accept 72 × 18
			A1	for 21.6 oe	
	(b)	No (supported)	M1	for a method to convert 20 m/s to km/h or 72 km/h to m/s, eg. $20 \times \frac{3600}{1000}$ (= 72) or $72 \times \frac{1000}{3600}$ (= 20)	Accept methods to convert **both** speeds to km/s or m/h
			C1	for No since 72 km/h = 20 m/s oe	
10	(a)	cf graph through (40, 5), (60, 25), (80, 35), (100, 38) and (120, 40)	C2	for a complete and accurate cf graph	May be a cumulative frequency curve or a cumulative frequency polygon Ignore any graph drawn to the left of the first point If histograms drawn, plots must be identified
			(C1	for at least 4 or 5 cf values plotted correctly)	
				SC: B1 for 4 or 5 points plotted not at end but consistently within each interval and joined provided no gradient is negative	
	(b)	answer in range 21 to 28	M1	for UQ in the range 66 to 70 or LQ in the range 42 to 46 or ft their cf graph	
			A1	for answer in range 21 to 28 or ft their cf graph	
	(c)	answer in the range $\frac{19}{40}$ to $\frac{24}{40}$	M1	for finding the difference between readings taken from the cf axis at points from a mark of 50 and a mark of 90 or ft their graph (if possible)	Their graph must be a cf graph
			A1	for an answer in the range $\frac{19}{40}$ to $\frac{24}{40}$ or ft their cf graph	Accept any equivalent fraction, decimal from 0.475 to 0.6 or percentage from 47.5% – 60%

Paper: 1MA1/1H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
11	72	M1	for $\frac{5}{30} = \frac{12}{p}$ oe, eg $\frac{12}{p} \times 30 = 5$ or $12 \div \frac{5}{30}$ **or** 5 : 30 = 12 : p **or** 1 in 6 (30 ÷ 5) counters are yellow, so 12 × "6" **or** using equivalent ratios to 5 : 30, eg. 2 : 12 and 10 : 60 and adding to give 2 + 10 : 12 + 60	
		A1	cao	
12	Mistake identified	C1	for a correct mistake identified **Acceptable examples** all three terms should be multiplied by 2 and not just two of them the 5 should be multiplied by 2 it should be $2 \times T = q + 2 \times 5$ should subtract 5 first (before multiplying by 2) **Not acceptable examples** Should remove the 5 first $2 \times T$ should be $2T$ should have got rid of the denominator	Accept answers showing a correct first step
13 (a)	$\frac{17x + 2}{3x(x + 1)}$	M1	for a correct common denominator with at least one correct numerator eg. $\frac{5\times3x}{3x(x+1)} + \frac{2(x+1)}{3x(x+1)}$	
		A1	for a single simplified fraction, eg. $\frac{17x+2}{3x(x+1)}$ or equivalent eg. $\frac{17x+2}{3x^2+3x}$	$\frac{15x+2(x+1)}{3x(x+1)}$ gets M1 only
(b)	$(x + y)(x + y + 3)$	B1	cao	

Paper: 1MA1/1H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
14	5	P1	for process to find the area of the triangle, eg. $0.5 \times (x + 4)(x - 2)$ oe OR for process to find the area of rectangle and 27.5×2, eg. $(x + 4)(x - 2)$ and 55	Trial and improvement methods must be fully correct identifying the value of x as 7 (3 marks) or the shortest side as 5 (4 marks)
		P1	(dep P1) for process to expand the brackets and derive a quadratic equation, eg. $x^2 + 4x - 2x - 8 = 55$ or $0.5(x^2 + 4x - 2x - 8) = 27.5$ oe	
		P1	(dep P2) for complete process to solve the quadratic equation $x^2 + 2x - 63 = 0$ eg $(x - 7)(x + 9)$ (= 0) or $\frac{-2 \pm \sqrt{2^2 - 4 \times 1 \times -63}}{2 \times 1}$ or $(x + 1)^2 - 1 - 63$ (= 0)	
		A1	cao SC: B1 for $x^2 + 4x - 2x - 8 = 27.5$	An answer of 5 with no supportive working gets no marks

Paper: 1MA1/1H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
15	$\frac{414}{990}$	M1	for (x =) 0.41818… or (10x =) $4.\dot{1}\dot{8}$ or 4.1818… or (100x =) $41.\dot{8}\dot{1}$ or 41.818… or (1000x =) $418.\dot{1}\dot{8}$ or 418.18…	
		M1	for using two recurring decimals with a terminating decimal difference, eg. (1000x – 10x =) $418.\dot{1}\dot{8} - 4.\dot{1}\dot{8}$ or 418.18… − 4.1818… (= 414)	Accept (100x – x =) $41.\dot{8}\dot{1} - 0.4\dot{1}\dot{8}$ or 41.818... – 0.41818... (= 41.4)
		A1	for $\frac{414}{990}$ oe, eg $\frac{23}{55}$	$\frac{41.4}{99}$ must be simplified to gain the accuracy mark
16 (a)	$2\sqrt{11}$	M1	for method to multiply numerator and denominator by $\sqrt{11}$ or a multiple of $\sqrt{11}$, eg $\frac{22}{\sqrt{11}} \times \frac{\sqrt{11}}{\sqrt{11}}$	
		A1	for $2\sqrt{11}$	
(b)	$\frac{6+\sqrt{3}}{11}$	M1	for method to multiply numerator and denominator by $2\sqrt{3} + 1$ or a multiple of $2\sqrt{3} + 1$, eg $\frac{\sqrt{3}}{2\sqrt{3}-1} \times \frac{2\sqrt{3}+1}{2\sqrt{3}+1}$	
		M1	(dep) for $\sqrt{3} \times 2\sqrt{3} = 6$ or $2\sqrt{3} \times 2\sqrt{3} = 12$	
		A1	for $\frac{6+\sqrt{3}}{11}$ (accept a = 6 and b = 11)	

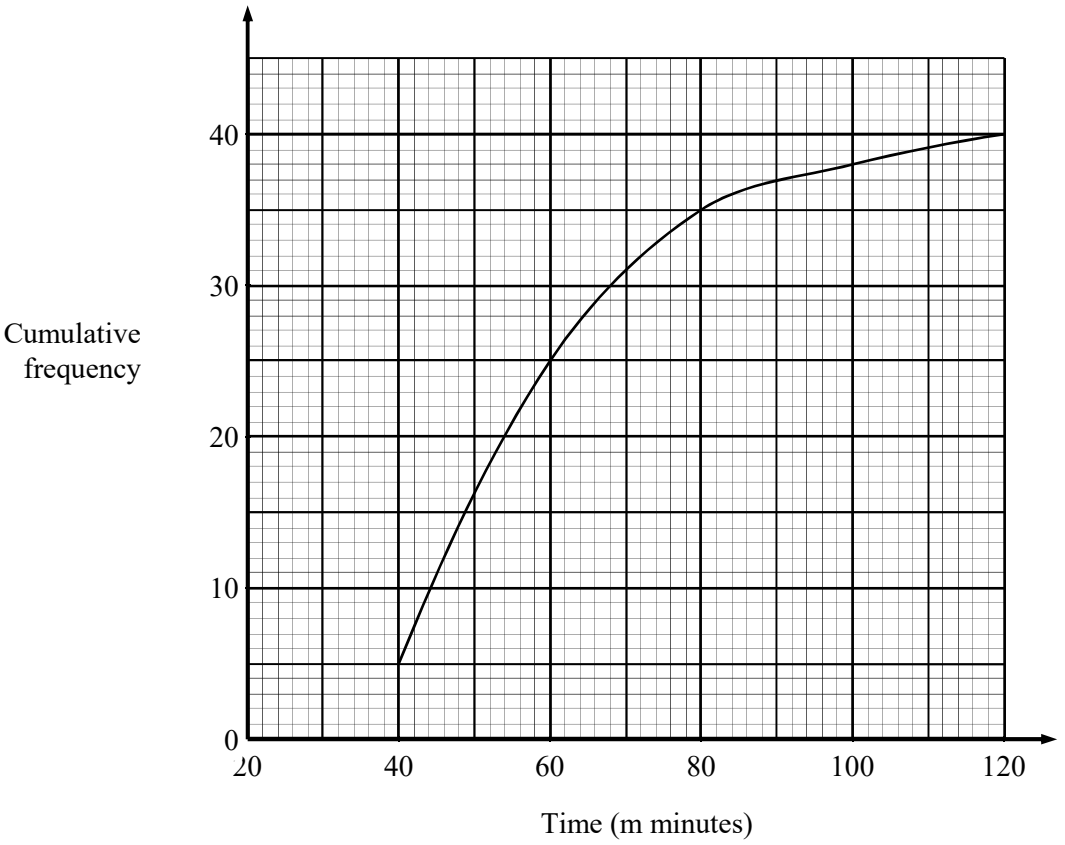
Paper: 1MA1/1H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
17	4	P1	for process to find ratio of corresponding lengths, eg. $\sqrt{4}$: $\sqrt{9}$ (= 2 : 3)	
		P1	for process to find ratio of volumes, eg "2"^{3} : "3"^{3} (= 8 : 27)	
		P1	for "27" ÷ "8" (= 3.375)	This may be seen by checking their volume, eg. "8" × 4 (= 32) and "8" × 3 (= 24)
		A1	for rounding to give an answer of 4 from correct working	An answer of 4 with no supportive working gets no marks

Paper: 1MA1/1H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
18 (a)	Shown	C1	for $f^{-1}(x) = \sqrt[3]{\frac{x+4}{2}}$ OR for $2x^3 - 4 = 50$ OR for substituting $x = 3$ to find f(3)	
		C1	for substituting $x = 50$ to show the result giving $f^{-1}(50) = 3$ OR solving for x to give $x = 3$ OR for showing that $f(3) = 50$	
(b)	$x = -1$ and $x = 2.5$	P1	for $hg(x) = (x + 2)^2$	
		P1	(dep) for start to a process to derive a quadratic equation eg. $x^2 + 4x + 4 = 3x^2 + x - 1$	$(x + 2)^2$ must be correctly expanded
		P1	for a process to solve the quadratic equation $2x^2 - 3x - 5 = 0$ eg $(2x - 5)(x + 1)$ (= 0) or $\frac{--3\pm\sqrt{(-3)^2-4\times2\times-5}}{2\times2}$ or $2\left[(x - \frac{3}{4})^2 - \frac{9}{16} - \frac{5}{2}\right]$ (= 0)	
		A1	for $x = -1$ and $x = 2.5$	2.5 or $2\frac{1}{2}$ or $\frac{5}{2}$ acceptable
19	$\frac{3}{4}$ oe	P1	for a first step to converting to a common base with one correct conversion, eg. $9^{-\frac{1}{2}} = 3^{-1}$ or $\frac{1}{3}$ or $27^{\frac{1}{4}} = 3^{\frac{3}{4}}$ oe	$9^{-\frac{1}{2}} = 3^{-1}$ (or $\frac{1}{3}$) oe or $27^{\frac{1}{4}} = 3^{\frac{3}{4}}$ oe seen alone gets the P1
		P1	(dep) for $3^{-1} = 3^{\frac{3}{4}} \div 3^{x+1}$ oe	
		A1	cao	

Paper: 1MA1/1H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
20 (a)	graph	C2	for a translation of the graph by the vector $\begin{pmatrix}-1\\-3\end{pmatrix}$	Condone graph of $y = f(-x)$ also being drawn on the grid
		(C1	for a translation of the graph by the vector $\begin{pmatrix}-1\\b\end{pmatrix}$ where $b \neq -3$ or $\begin{pmatrix}a\\-3\end{pmatrix}$ where $a \neq -1$ **or** for a translation by the vector $\begin{pmatrix}-1\\-3\end{pmatrix}$ of 3 or 4 critical points)	Correct vector gets 1 mark
(b)	2, 1	B1	cao	
21	Sketch graph with TP at (2, -13) and intercepts at (0, -5), $(2+\sqrt{\frac{13}{2}}, 0)$ and $(2-\sqrt{\frac{13}{2}}, 0)$	B1	for a parabola drawn with intercept at the point (0, – 5)	
		M1	for the start of a method to find the roots of $y = 0$, eg. $2(x-2)^2 - 13 (= 0)$ oe or $(x =) \frac{--8 \pm \sqrt{(-8)^2-4\times2\times-5}}{2\times2}$	
		M1	(dep) for method to find the roots, eg. $2 \pm \sqrt{\frac{13}{2}}$ oe	
		B1	for turning point at $(2, -13)$	Turning point may be just seen and labelled on the sketch
		C1	for a fully correct parabola drawn with turning point at $(2, -13)$ and intercepts at $(0, -5)$, $(2+\sqrt{\frac{13}{2}}, 0)$ oe and $(2-\sqrt{\frac{13}{2}}, 0)$ oe clearly shown	

Paper: 1MA1/1H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
22	Proof	C1	for **one** correct pair of equal angles with correct reason from: angle *ACB* = angle *ADB*, (angles in the same segment are equal) angle *DBC* = angle *DAC*, (angles in the same segment are equal) angle *ABD* = angle *ACD*, (angles in the same segment are equal) **or** for recognising all angles of 60 in triangle *AED* **and** in triangle *CEB*)	Underlined words need to be shown; reasons need to be linked to their statement(s) Pairs of equal angles may be just shown on the diagram
		C1	for **one** identity, with reason(s), from the following list of alternatives: **Alternatives:** a complete method to show that angle *ACB* = angle *DBC* (= 60), **or** *BC* being common to both triangles **or** *DB* = *DE*+*EB* = *AE*+*EC* = *AC* (sides of an equilateral triangle are equal) **or** angle *ABC* = 60 + angle *ABD* = 60 + angle *ACD* = angle *DCB* (angles in the same segment are equal) **or** angle *BDC* = angle *CAB* (angles in the same segment are equal)	
		C1	for a **second** identity, with reason(s), from the alternatives above	
		C1	for concluding the proof with a **third** identity, with reason(s), from the alternatives above, together with the condition for congruency, ASA or SAS or AAS	

Q10(a)


Cumulative frequency
40
30
20
10
0
20
40
60
80
100
120
Time (m minutes)

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

Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme.

The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:
Angles: ±5º
Measurements of length: ±5 mm

PAPER: 1MA1_1H			
Question		**Modification**	**Mark scheme notes**
2		Wording changed to 'Using the information work out the value of n.'	Standard mark scheme
4		P moved 1 cm to the left.	Standard mark scheme
5		Diagram enlarged. Wording added 'Angle BAC = 75° Angle ABC =51°.' Angles moved outside of the angle arcs and angle arcs made smaller.	Standard mark scheme
8		North lines made 9 cm. Scale moved above the diagram. Changed the scale from '1 cm represents 4km' to '1 cm represents 2 km.'	Standard mark scheme but note the scale change P1 for a process to work out the distance *PQ*, eg. 12 × 1.5 (= 18) P1 for the process to use the given scale eg. "18" ÷ 2 (= 9 cm) Award P3 for *Q* shown in the correct place on the diagram. A1 for distance in the range 20 to 23 A1 for bearing in the range 317 to 330

10		Table left aligned. Diagram enlarged. Right axis labelled. Axes labels moved to the left of the horizontal axis and above the vertical axis. Frequency table: $20 < m \leq 40$ 5 $20 < m \leq 60$ 10 $20 < m \leq 80$ 25 $20 < m \leq 100$ 35 $20 < m \leq 120$ 40	Part (a) Standard mark scheme but plots at values shown. Part (b): M1 for UQ = 90 (±2) or LQ = 60 (±2) or ft their cf graph A1 answer in the range 36 to 44 Part (c): M1 for finding the difference between readings taken from the cf axis at points from a mark of 50 and a mark of 90 eg 30 – 7.5 A1 answer in the range 19/40 to 26/40

PAPER: 1MA1_1H			
Question		**Modification**	**Mark scheme notes**
12		MLP only- q changed to m.	Standard mark scheme
13	(a)	MLP only – x changed to y.	Standard mark scheme with letters changed as indicated.
13	(b)	MLP only – x and y changed to e and f.	Standard mark scheme with change of letters as indicated.
14		Diagram enlarged. Triangle vertices labelled *ABC*. Wording '*ABC*' added. Wording '$BC = (y+4)$ cm' and 'BA = $(y-2)$ cm' added. MLP only – x changed to y	Standard mark scheme with change of letters as indicated.
17		Diagram enlarged; model may be provided. Labels removed from inside the shapes and above the containers labelled 'container A' and 'container B'. Wording changed to 'They show two similar cylindrical containers, container A and container B' ; Container A is smaller than container B.'	Standard mark scheme
20		Diagram enlarged. In part (a) the wording changed from '$y = f(x+1) - 3$' to '$y = f(x+1) - 5$'.Braille only – only point A on the diagram and wording 'Point A (-2,1)' added above the diagram.	Standard mark scheme, but note the graph required to be drawn in part (a) is now 2 squares below that normally expected, so in the standard mark scheme replace -3 by -5
21		A pair of axes provided.	Standard mark scheme
22		Diagram enlarged.	Standard mark scheme

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