Mark Scheme (Results)

November 2019

Pearson Edexcel GCSE (9 – 1)
In Mathematics (1MA1)
Higher (Calculator) Paper 2H

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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: 1MA1/2H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
1	Two statements	C2	Two different statements **Acceptable** There is no 'frequency' label / *y*-axis is not labelled / no title for the *y*-axis The polygon should not be closed / have a line at the bottom / have first and last points connected (15, 6) has been plotted incorrectly / at (15, 8) / (The first point is at) 8 rather than 6 / First point is on an incorrect frequency **Not acceptable** There is no title / Points should be joined with a curve / *x*-axis doesn't start at 0 There is no label / The axes have not been labelled (*x* and *y*) The points haven't (all) been plotted correctly $10 < w \leq 20$ and $30 < w \leq 40$ have been plotted wrong The first point is plotted incorrectly, its at (15, 7) not (15, 6) The points have been joined up wrong / Points should not be joined in the shape of a triangle / They've connected all the points Done the midpoints rather than the numbers on the right side / The points are in the middle	Ignore additional statements provided no contradiction
		(C1	for one statement eg from those above)	
2	127.5 and 128.5	B1	for 127.5 in the correct position	
		B1	for 128.5 in the correct position	Accept $128.4\dot{9}$ or 128.499...
3	18	P1	for 240 ÷ 10 (= 24) **or** 240 ÷ 8 (= 30)	Accept 3 + 7 for 10, 3 + 5 for 8
		P1	for 3 × "24" (= 72) **or** 7 × "24" (= 168) **or** 3 × "30" (= 90) **or** 5 × "30" (= 150)	
		P1	for 3 × "24" (= 72) **and** 3 × "30" (= 90) **or** 7 × "24" (= 168) **and** 5 × "30" (= 150)	
		A1	Cao	

Paper: 1MA1/2H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
4 (i)	238	P1	for working with proportion eg $\frac{17}{50} \times 700$ oe	
		A1	cao	
(ii)	statement	C1	for statement **Acceptable** Sample is representative (otherwise answer wrong) Random sample (otherwise answer will be different) The 50 people are from the 700 (otherwise not accurate) 17 out of **every** 50 want a sports bag (otherwise answer will be different / wrong) There is no bias That the other 650 will want the same gifts as the 50 **Not acceptable** There would be more than 17 people who want the sports bag I rounded my answer 17 out of 50 want a sports bag A repeat of the calculation done in (i) Most of the people would want a sports bag References as what might change in the future (eg a change in membership) That all 700 people wanted a type of gift rather than no gift (otherwise would have changed my answer)	
5 (a)	F	B1	cao	
(b)	D	B1	cao	
6	Shown (supported)	M1	for method to find at least two terms, eg $2 \times 4^2 - 1$ (= 31) **and** $40 - 3^2$ (= 31)	1 7 17 31 49 71 97 127 161 199 39 36 31 24 15 4 –9
		M1	for generating at least three correct terms of each sequence	
		A1	for generating at least the terms 1, 7, 17, 31, 49 of the first sequence **and** at least the terms 39, 36, 31, 24, 15, 4 of the second sequence	

Paper: 1MA1/2H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
7	4.56×10^{-2}	M1	for 0.000000342 ÷ 0.0000075 **OR** for 0.0456 oe eg 0.456×10^{-1} **or** 45.6×10^{-3} **or** $\frac{57}{1250}$ **OR** for an answer of 4.56×10^{n}	
		A1	cao	
8	6	M1	for 720 ÷ 40 (= 18) **or** 720 ÷ 30 (= 24)	
		M1	for a complete process eg (720 ÷ 30) – (720 ÷ 40) **or** "18" × 4/3 – "18" **or** "24" – "24" × 3/4	
		A1	cao	
9	No (supported)	P1	for finding the area of 3 or more faces of the cuboid **and** adding eg (6 × 8) + (8 × 18) + (6 × 18) … or "48" + "144" + "108" … (= 300)	Could be an addition of *any* three faces eg 48 + 48 + 144 etc.
		P1	complete process to find surface area of cuboid, eg 6 × 8 × 2 + 6 × 18 × 2 + 8 × 18 × 2 (= 600)	
		P1	for process to find side length of cube, eg [surface area] ÷ 6 **and** square rooting (= 10) **OR** for a process to find the volume of the cuboid 6 × 8 × 18 (= 864) **and** cube rooting (= 9.52…) to find a side length	[surface area] must come from the addition of at least three attempts at area, but not from volume.
		P1	(dep on previous P1) for processes to find volume of cube **and** volume of cuboid, eg [side length]^3 (= 1000) **and** 6 × 8 × 18 (= 864) **OR** (dep on previous P1) for process to find surface area of cube, eg. ("9.52…")^2 × 6 (= 544.28…)	
		A1	No with 1000 **and** 864 **OR** No with 600 **and** 544(.28…)	

Paper: 1MA1/2H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
10	$k = 2m - y^2$	M1	correct first step of showing an intention to square both sides with no algebraic ambiguity in any resulting statements, eg $y^2 = 2m - k$	
		A1	for $k = 2m - y^2$	
11 (a)	Explanation	C1	eg 'No' the median is 57	
(b)	Comparison	C1	(ft) a correct comparison of medians eg the median weight for Megan was greater than the median weight for Amy	Simply quoting values for median, range and IQR is insufficient, they must be compared
		C1	a correct comparison of a measure of spread eg the interquartile range of weights for Megan was greater than the interquartile range of weights for Amy For the award of both marks at least one of the comparisons must be in the context of the question	Median Range IQR Megan 57 49 26 Amy 42 47 16 Figures given must be correct. Comparisons can relate to the range or the IQR
12	32.1	P1	starts process, eg $\sin 40 = \frac{DB}{8.6}$ oe or for 8.6 × sin 40 (=5.52797…)	Accept values rounded or truncated to 2 dp.
		P1	complete process to find *ED*, eg (8.6 × sin40) ÷ 2 (=2.76...)	
		P1	process to find angle *EAD*, eg $\tan^{-1}\left(\frac{"2.76...."}{4.4}\right)$ or $\tan^{-1}$ ("0.628…")	
		A1	answer in range 32.09 to 32.2	If an answer in the range is seen in working and then incorrectly rounded award full marks

Paper: 1MA1/2H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
13	2.2	P1 P1 A1	works out interest for one year, eg 3550 × 0.026 (= 92.3(0)) **or** 3550 × 1.026 (=3642.3(0)) for compound interest calculation, eg 3550×1.026^2 (= 3736.9…) **or** for an answer given as 0.0219… or 1.0219… answer in range 2.19 to 2.2	 If an answer in the range is seen in working and then incorrectly rounded award full marks
14	7	M1 A1	method to find number of combinations, eg 19 × 25 oe (= 475) **or** for 3325 ÷ 19 (= 175) **or** 3325 ÷ 25 (= 133) cao	
15	$6x^3 - 23x^2 - 33x - 10$	M1 M1 A1	for method to find the product of any two linear expressions (3 out of no more than 4 terms correct with correct signs or 4 correct terms ignoring signs) for method of multiplying out remaining products, half of which are correct (ft their first product) cao	Note that, for example, $6x^2 + 7x$ or $7x + 2$ are regarded as three terms in the expansion of $(3x + 2)(2x + 1)$ First product must be quadratic but need not be simplified or may be simplified incorrectly

Paper: 1MA1/2H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
16	$\frac{52}{72}$	P1	for $\frac{4}{9}\times\frac{3}{8}$ $\left(\frac{12}{72}\right)$ **or** $\frac{4}{9}\times\frac{5}{8}$ **or** $\frac{5}{9}\times\frac{4}{8}$ $\left(\frac{20}{72}\right)$	
		P1	for $1-$ $\left(\frac{5}{9}\times\frac{4}{8}\right)$ **or** $\frac{4}{9}\times\frac{3}{8}+\frac{4}{9}\times\frac{5}{8}+\frac{5}{9}\times\frac{4}{8}$ oe	
		A1	for $\frac{52}{72}$, $\frac{13}{18}$ oe SC B1 for answer of $\frac{56}{81}$ (replacement)	Accept equivalent fractions, decimals (0.72…) or percentages (72.22…..%)
17	61	B1	angle *OAD* = 90, may be marked on diagram	Angle could be shown by a right-angle symbol
		M1	method to work out angle *OAB* (=29)	Correct method can be implied from angles on the diagram if no ambiguity or contradiction. Reasons need not be given.
		A1	cao	Award 0 marks for an answer of 61 with no other working.
18	Bar of height 3.2	M1	method to find any frequency eg 1.2 × 2.5 (= 3) or 2 × 2.5 (= 5) or 2.8 × 5 (= 14) or 0.8 × 12.5 (= 10) **or** method to use areas eg 12 × 5 (=60) or 20 × 5 (=100) or 28 × 10 (=280) or 8 × 25 (=200)	Accept equivalent methods proportional to those shown
		M1	complete method to find total frequency for the four intervals eg "3" + "5" + "14" + "10" (=32) **or** "60" + "100" + "280" + "200" (=640)	
		C1	cao	

Paper: 1MA1/2H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
19	155	M1	for a complete method to find the volume of the hemisphere, eg $\frac{1}{2}\times\frac{4}{3}\times\pi\times4.2^3$ oe	
		A1	answer in range 155 to 155.2	If an answer in the range is seen in working and then incorrectly rounded award full marks
20	160 (supported)	B1	stating bound of 10.85 or 10.95	Accept $10.94\dot{9}$ or 10.9499... for 10.95
		M1	using both UB **and** LB to work out value of d eg [UB of c]$^3 \div 8$ **and** [LB of c]$^3 \div 8$ **or** gives a bound of 159.66... from correct working **or** gives a bound of 164.11... from correct working	$10.9 < \text{UB} \leq 10.98$ $10.85 \leq \text{LB} < 10.9$
		A1	for 159.66... **and** 164.11... from correct working	Accept bounds rounded or truncated to at least 4 sig fig
		C1	for 160 from 159.66... and 164.11... with a supporting reason eg "since both UB and LB round to 160"	

Paper: 1MA1/2H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
21 (a)	52.5	P1	starts to find area under graph, eg $\frac{30\times12}{2}$ (=180) **or** 50 × 12 (=600) **or** $\frac{20\times12}{2}$ (=120)	
		P1	complete process to find area under graph, eg $\frac{30\times12}{2}+50\times12+\frac{20\times12}{2}$ (= 900)	
		P1	starts process to find half way time, eg (("900" ÷ 2) – 180) ÷ 12 (=22.5)	
		A1	52.5 oe	
(b)	Comparison	C1	acceptable comparison **Acceptable** (acceleration) during first part is positive but (acceleration) during last part is negative / deceleration (acceleration is) greater during the last part than during the first part gradient is steeper in the last part / longer to speed up than slow down speed / (acceleration) is increasing at start and decreasing at end (acceleration) is slower in the first part (acceleration) is ascending in the first part and descending in the last part 0.4 is the first part and –0.6 in the last part **Not acceptable** goes down in the last part speed is greater in last part than first part	

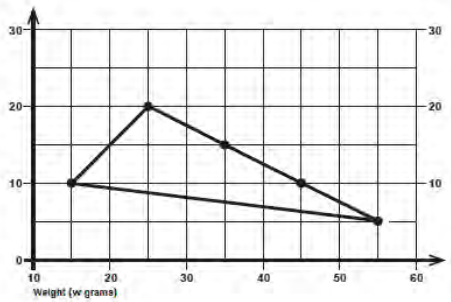
Paper: 1MA1/2H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
22 (a)	163 or 164	P1	uses formula eg $1.2 \times 200 - 50$ (= 190)	
		P1	for complete process, eg May: $1.2 \times$ "190" $- 50$ (= 178) **and** June: $1.2 \times$ "178" $- 50$ (= 163.6)	
		A1	for 163 or 164	
(b)	Statement	C1	(dep P1) ft statement, eg there won't be any rabbits, fewer rabbits, decrease	
23 (a)	Shown	C1	for a method to find the area of half of the parallelogram or of the whole parallelogram, eg $\frac{1}{2}(2x - 1)(10 - x)\sin 150$ or $\frac{1}{2}(2x - 1)(10 - x) \times \frac{1}{2}$ oe or $(2x - 1)(10 - x)\sin 150$ or $(2x - 1)(10 - x) \times \frac{1}{2}$ oe	
		C1	for a correct expansion of the whole area eg $\frac{1}{2}(20x - 10 - 2x^2 + x)$ or $\frac{1}{2}(-2x^2 + 21x - 10)$ or $-x^2 + 10.5x - 5$	
		C1	complete chain of reasoning with fully correct algebra dealing with the inequality eg $x^2 - 10.5x + 5 < -15$ or $x^2 - 10.5x + 20 < 0$ or $2x^2 - 21x + 10 < -30$ which lead to $2x^2 - 21x + 40 < 0$	
(b)	$2.5 < x < 8$	M1	for factorising, $(2x - 5)(x - 8)$	Could use the formula
		A1	for critical values, 2.5, 8	
		A1	for any statement that x is greater than 2.5 and x is less than 8	Need not be given as an inequality statement

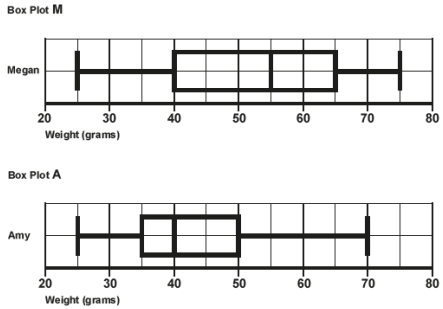
Paper: 1MA1/2H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
24	Description	C2	for (rotation) 90º clockwise about (–1, 0) or (rotation) 90º anticlockwise about (–1, 6) or (rotation) 180º about (–1, 2) or (rotation) 180º about (–1, 4)	Award 0 marks if there is reference to other transformations eg coordinates given as vectors (which is a translation)
		(C1	for (–1, 0) or (–1, 6) or (–1, 2) or (–1, 4))	
25	9.75	P1	process to find the gradient of **L** $\left(=-\frac{3}{2}\right)$	
		P1	process to find the gradient of the perpendicular line **M** eg use of $-\frac{1}{m}$ or states gradient as $\frac{2}{3}$ **or** $y=\frac{2}{3}x+c$	
		B1	(indep) gives y coordinate of $B = 8.5$ oe	Could be indicated other ways, eg 8.5 on the y axis of a diagram
		P1	(dep P2) process to find x coordinate of C (= 3) or y coordinate of C (= 4) eg the first stage of solving equations or using elimination by substitution, to find a coordinate of C.	ft their linear equation for M with L; allow some error in manipulation of these linear equations as long as the overall process is correct.
		A1	9.75 oe	Award 0 marks for a correct answer with no supportive working.

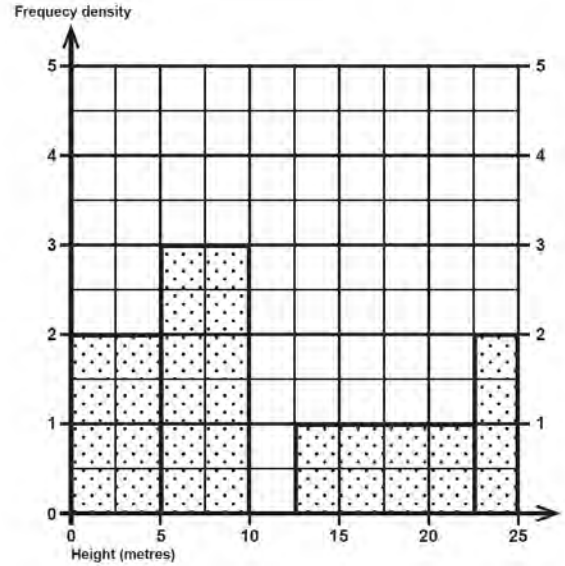
Modifications to the mark scheme for Modified Large Print (MLP) papers: 1MA1 2H

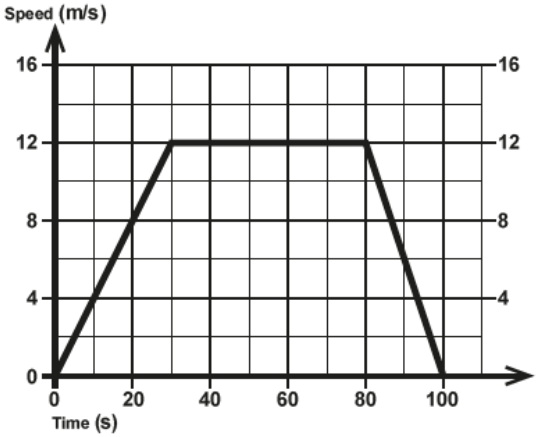
Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme.

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

PAPER: 1MA1_2H			
Question		**Modification**	**Mark scheme notes**
1		Diagram enlarged and changed:  Crosses changed to solid circles. Axes label moved to the left of the horizontal axis. Frequency changed as follows: $10 < w \leq 20$ 5 $20 < w \leq 30$ 20 $30 < w \leq 40$ 15 $40 < w \leq 50$ 10 $50 < w \leq 60$ 5 Question wording changed from '50 potatoes' to '55 potatoes'.	Standard mark scheme, but reference to the first point is now "(15,5) has been incorrectly plotted at (15,10)"
3		Wording added 'Tom and Adam have some stamps.' Information moved to Diagram Book.	Standard mark scheme
5		Diagram enlarged. Graphs labelled as 'Graph A, graph B etc'.	Standard mark scheme
9		Diagrams enlarged; models should be provided for all candidates. Wording added 'The cuboid has length 18 cm, width 8 cm and height 6 cm.'	Standard mark scheme.

PAPER: 1MA1_2H			
Question		**Modification**	**Mark scheme notes**
11		Box plots changed as shown.  Wording added 'They show box plot M and box plot A.' Megan's box plot labelled 'Box plot M' and Amy's box plot labelled 'Box plot A.' Horizontal axes labels moved to the left. Megan's box plot: Lowest 25, Highest 75, Median 55, IQR 40-65 (=25), range = 50 Amy's box plot: Lowest 25, Highest 70, Median 40, IQR 35-60 (=25), range = 45	Part (a): C1 explanation eg 'No' the median is 55 Part (b): C1: a correct comparison of medians eg the median weight for Megan was greater than the median weight for Amy C1: a correct comparison of a measure of spread eg the IQR of weights for Megan was the same as the IQR of weights for Amy For the award of both marks at least one of the comparisons must be in the context of the question Additional guidance: Simply quoting values for median, range and IQR is insufficient, they must be compared Figures given must be correct. Comparisons can relate to the range or the IQR
12		Diagram enlarged. Angle *EAD* marked with an angle arc. Angle moved outside of the angle arc and the angle arc made smaller.	Standard mark scheme
15		MLP only: *x* changed to *y*.	Standard mark scheme with letters changed as indicated.
16		Wording added 'Each card is numbered from 1-9.'	Standard mark scheme
17		Diagram enlarged. Angle moved outside of the angle arc and the angle arc made smaller.	Standard mark scheme

PAPER: 1MA1_2H			
Question		**Modification**	**Mark scheme notes**
18		Histogram changed as shown below.  Diagram enlarged. Right axis labelled. Shading changed to dotty shading. Axes labels moved to the left of the horizontal axis and above the vertical axis. Wording added 'It shows an incomplete histogram.' Grid extended to 5 on the vertical axis.	Mark scheme adjusted as follows: M1: method to find any frequency, eg 2 × 5 (= 10) **or** 3 × 5 (= 15) **or** 1 × 10 (= 10) **or** 2 × 2.5 (= 5) oe **or** method to use areas eg 2 × 4 (=8) or 2 × 6 (=12) or 4 × 2 (=8) or 1 × 4 (=4) oe complete method to find total frequency for the four intervals eg "10 + "15" + "10" + "5" (=40) **or** "8" + "12" + "8" + "4" (=32) C1: Bar of height 4 (8 squares high)
19		Diagram enlarged. Wording added for MLP only 'A hemisphere is half a sphere.' Formula placed above hemisphere. Wording for Braille only: 'The model represents a hemisphere with diameter 8.4cm.'	Standard mark scheme
20		Braille only- c changed to r and d changed to s	Standard mark scheme with the letters changed as indicated.

PAPER: 1MA1_2H			
Question		**Modification**	**Mark scheme notes**
21		Diagram enlarged. Right axis labelled. Vertical axis marked in units of 4. Axes labels moved to the left of the horizontal axis and above the vertical axis.  	Standard mark scheme
23		Diagram enlarged. Angle moved outside of the angle arc and the angle arc made smaller. Wording added 'with sides $(2x - 1)$ cm and $(10 - x)$ cm. An angle of 150° is marked'	Standard mark scheme
24		Diagram enlarged. Shading changed to dotty shading. Wording added 'It shows square *ABCD* on a coordinate grid.' Shape provided for all candidates labelled *ABCD* on both sides. Wording added 'A cut out shape may be available if you wish to use it.'	Standard mark scheme

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