Mark Scheme (Results)

November 2017

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.

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.

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
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	**Working**	**Answer**	**Mark**	**Notes**
1		$1\frac{1}{2}$	M1	for correct expansion of the bracket or dividing all terms by 3 as a first step eg $3x - 3$ or $(5x - 6)/3 = 3(x - 1)/3$
			M1	for isolating terms in x on one side of an equation eg $5x - 6 - 3x = -3$ or both constants on one side of an equation, eg $5x = 3x - 3 + 6$, ft $5x - 6 = 3x - 1$
			A1	for $1\frac{1}{2}$ oe
2	£6 − £5.64 = 36p or 50p – 47p = 3p	6.4	P1	for a strategy to compare the same number of bottles e.g. £5.64 ÷ 12 (= 47 or 0.47) or 12 × 50p (= 6 or 600) or 36 or 0.36 or 3 or 0.03
			P1	for start of process to find percentage profit e.g. $\frac{"36"}{564}$ or $\frac{"3"}{"47"}$ or $\frac{"6"}{5.64}$ or $\frac{50}{"47"}$ oe with consistent units
	6.3829787…%		A1	for answer in the range 6.3 to 6.4

Paper: 1MA1/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
3 (a)		31.4	P1	for working with circumference formula, eg $\pi \times 80$ (=251. …) oe
			A1	for answer in the range 31.4 to 31.5 accept 10π
(b)		No (supported)	C1	Mean distance stays the same with reason, eg total distance remains unchanged or same number of points
4		$\frac{1}{11}$	P1	for starting the process, eg by writing down a correct ratio or using a given number of cubes for one relationship, eg 2B 1Y or B:Y = 2:1 or 4G 1B or G:B = 4:1 or 8G, 1Y or G:Y = 8:1 oe or yellow = 2, blue = 4, or states 2:1:8 oe in any order (can be algebraic)
			P1	for complete process to find possible number of each colour or equivalent ratio, eg 8G 2B 1Y or G:B:Y = 8:2:1 oe or yellow = 2, blue = 4, green = 16 oe (can be algebraic)
			A1	$\frac{1}{11}$ oe
5 (a)		(−2, 1) (−4, 1) (−2, 2) (−5, 2)	B1	Shape labelled **A**
(b)		(1, −4) (3, −4) (1, −5) (4, −5)	B1	Shape labelled **B**

Paper: 1MA1/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
6 (a)		6	B1	cao
(b)		5	B1	cao
(c)		Shown	M1	for writing 100^a or 1000^b as a power of 10 ($=10^{2a}$ or 10^{3b}) or $10^{2a + 3b}$ or $100 = 10^2$ and $1000 = 10^3$
			C1	for complete chain of reasoning leading to conclusion

Paper: 1MA1/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
7		32.3	P1	for using Pythagoras to find length of third side of triangle, eg $7.5^2 - 6^2$ or $6^2 + x^2 = 7.5^2$ or uses trigonometry to find angle in triangle, eg $\sin A = \frac{6}{7.5}$ or $\cos B = \frac{6}{7.5}$
			P1	(dep P1) for complete process to find length of third side of triangle eg $\sqrt{7.5^2 - 6^2}$ or $\sqrt{56.25 - 36}$ or $\sqrt{20.25}$ (= 4.5) or uses trigonometry to find base length of triangle, eg 7.5 × cos "*A*" or 7.5 × sin "*B*" or $\frac{6}{\tan "A"}$
			P1	(dep P2) for 24 – 10 – "4.5" (= 9.5)
			P1	(indep) for process to find angle *CDA*, eg tan *CDA* = $\frac{6}{\text{base}}$ from right- angled triangle
			A1	for answer in the range 32.2 to 32.3
8 (a)		2.7560…	M1	for 1.0654(059…), 0.1402(633…), 7.5957(541…), 2.756 truncated or rounded to no less than 2dp
			A1	for 2.7560(….)
(b)		2.76	B1	for 2.76 ft from (a)

Paper: 1MA1/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
9		65.60	P1	for start in using inverse proportionality, eg 5×4.5 (= 22.5) or $4.5 = \frac{k}{5}$ or $5 \times 4.5 \times 60$ (= 1350) or $\frac{5}{3}$ or $\frac{3}{5}$
			P1	for process to find number of hours for each cleaner today, eg $\frac{22.5}{3}$ (= 7.5)
			A1	for 65.6(0)
				(SC B2 for 61.5(0))
10 (a)		0 to 20 seconds	B1	for between 0 seconds and 20 seconds
		with reason	C1	for reason given eg gradient is greatest oe
(b)		18	B1	ft from (a)
11		0.119	P1	for starting the process, eg finds area 25π or 16π oe, or finds angle for town A, 0 – 19 (70°), may be on diagram
			P1	for a complete process, eg $\frac{70}{360} \times \frac{25\pi}{41\pi}$
			A1	0.118 – 0.119 or 11.8% - 11.9%

Paper: 1MA1/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
12		15	P1	for a process to find the interior or exterior angle of a regular 12 sided polygon e.g. $\frac{10\times180}{12}$ (= 150) or $\frac{360}{12}$ (= 30), must be no contradictions
			P1	for process to find angle *STR*, eg $\frac{180-"150"}{2}$ or $\frac{"30"}{2}$
			A1	cao
13 (a)		58600	M1	for a complete method, eg 50000 × 1.02^8 (= 58582(.969...)) or for finding the increase in value of the company after 8 years, eg 8582(.969...) or 8600
			A1	cao
(b)		4.5	P1	for a process to find multiplier for 6 year period, eg 325 ÷ 250 oe (= 1.3) or 130(%) or for 250000 × y^6 = 325000
			P1	for a process to find multiplier for one year, eg $("1.3")^{\frac{1}{6}}$ or 1.044…or 1.045
			A1	4.4 – 4.5

Paper: 1MA1/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
14		Region R shaded	M1 M1 A1	for two of the lines $y = 1$, $x + y = 5$, $y = 2x$ correctly drawn for three lines correctly drawn for fully correct region indicated with all lines correct
15 (a)		No with reason	C1	for "no" with reason, eg Tracey should multiply 8 and 7
(b)		66	M1 A1	for starting a method to find number of games played, eg 12×11 (= 132) or sum of integers from 1 to 11 cao
16	$\frac{--4 \pm \sqrt{(-4)^2 - 4 \times 1 \times 1}}{2 \times 1}$	0.268, 3.73	M1 A1	for $x - 2 = \pm\sqrt{3}$ oe or one solution or use of $x^2 - 4x + 1 = 0$ to substitute into formula (allow one error in substitution) 0.267 – 0.27, 3.7 – 3.74

Paper: 1MA1/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
17 (a)	1.5, 6, 10.2, 7.2, 1.2	Histogram drawn	C1	for 2 correct bars of different widths or at least 3 correct frequency densities.
			C1	for all bars in correct proportions or 4 correct bars with axes scaled and labelled.
			C1	for fully correct histogram with axes scaled and labelled.
(b)		$\frac{123}{150}$	M1	for a method to find number of students in interval, eg $30 + 51 + 36 + \frac{1}{3} \times 18$ (= 123) or $150 - 15 - \frac{2}{3} \times 18$ (= 123)
			A1	for $\frac{123}{150}$ oe or 0.82 or 82%
18		0.98	B1	cao

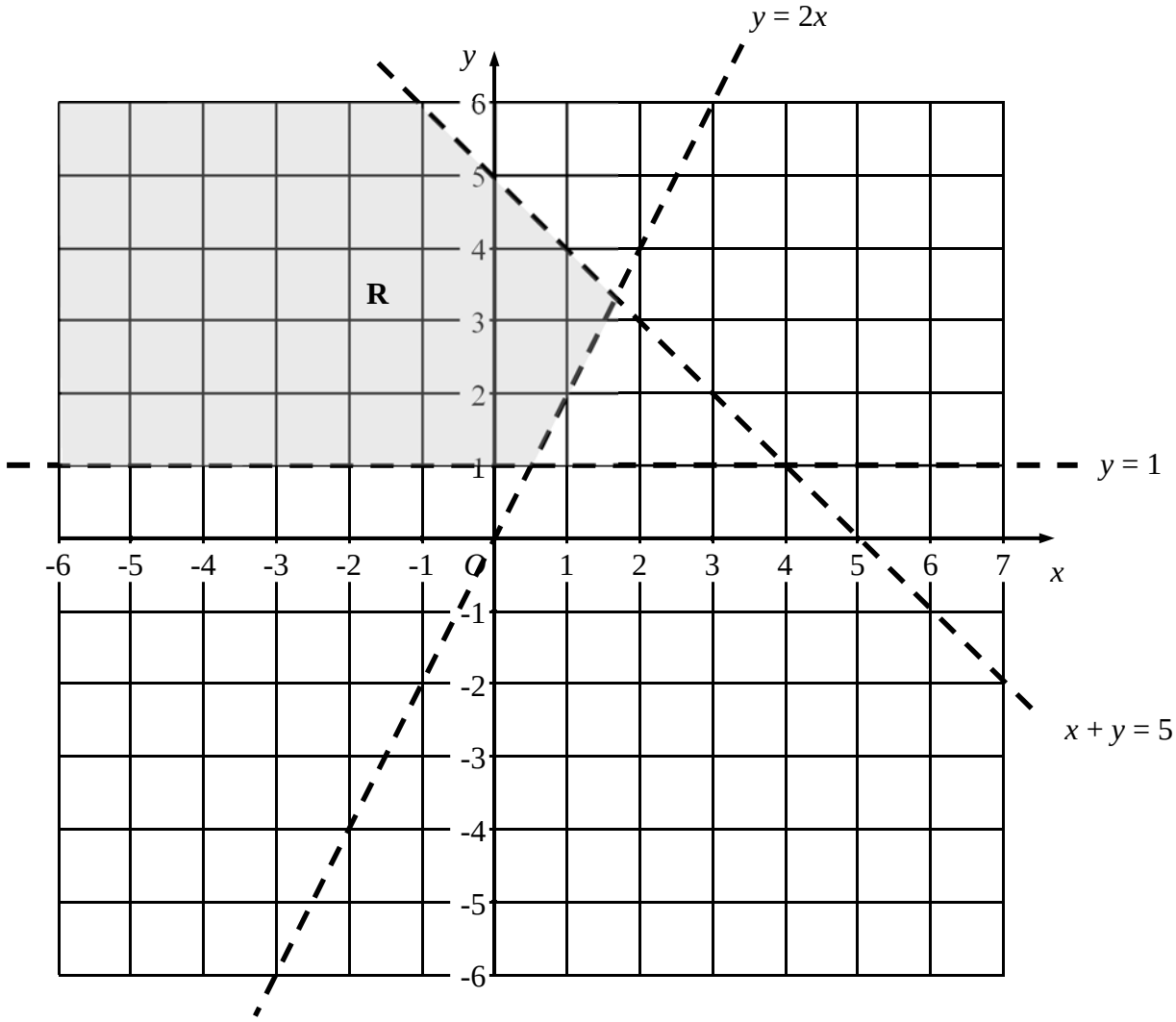
Paper: 1MA1/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
19		Proof (supported)	M1	for a method to find coordinates of $M(-1, -1)$ or $N(3, 1)$
			M1	for method to find gradient of MN or PR or for method to find column vector for MN or PR or for differences of x coordinates and differences of y coordinates for MN or PR
			A1	for gradients of MN and PR , ie ½ oe or for column vectors of MN and PR, $\overrightarrow{MN} = \begin{pmatrix} 4 \\ 2 \end{pmatrix}$ and $\overrightarrow{PR} = \begin{pmatrix} 8 \\ 4 \end{pmatrix}$ or for differences of x coordinates and of y coordinates for MN and PR
			C1	for conclusion from reasoning and correct working

Paper: 1MA1/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
20		68.5	B1	for angle *OAB* = 90° or angle *OCB* = 90°, may be seen on diagram
			P1	for a process to find the length of *AB* or the length of *CB* (= $10\sqrt{3}$ oe) eg $10 \times \tan 60°$ (= 17.3...) or the length of *OB* (= 20), eg $10 \div \cos 60°$
			P1	for a process (dep previous P1) to find the area of the triangle *OAB* (= $50\sqrt{3}$ oe) or area of triangle *OCB* (= $50\sqrt{3}$ oe) or area of kite *OABC* (= $100\sqrt{3}$ oe)
			P1	for a process to find the area of the sector *OAC* e.g. $\frac{1}{3} \times \pi \times 10^2$ (= 104.7...),accept rounded or truncated to 3 significant figures or more
			A1	for 68.4 − 68.6

Paper: 1MA1/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
21 (a)		$\frac{1}{55}$	M1	for $\frac{4}{12} \times \frac{3}{11} \times \frac{2}{10}$
			A1	for $\frac{1}{55}$ oe
(b)		Conclusion (supported)	C1	starts correct argument, eg by calculating a relevant probability, eg $\frac{5}{15} \times \frac{4}{14} \times \frac{3}{13}$
			C1	statement of "more likely" from eg comparison of probabilities, ft answer to (a) eg $\frac{1}{55}$ (= 0.018…) and $\frac{2}{91}$ (= 0.021…or 0.022)
22		7, −1	P1	for strategy to use g(3) = 20, e.g. $3a + b = 20$
			P1	for g(1) = $a + b$
			P1	for a process to find inverse of f. e.g. $f^{-1}(x) = \frac{x-3}{5}$ or $f^{-1}(33) = 6$
			P1	for using $f^{-1}(33) = g(1)$ to find an equation e.g. $\frac{33-3}{5} = a + b$
			A1	for $a = 7$, $b = -1$

Paper: 1MA1/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
23 (a)		2	M1	for start to express the common ratio algebraically, eg $1/(\sqrt{x} - 1)$ or $(\sqrt{x} + 1)/1$ or $\sqrt{x} + 1 = k \times 1$ or $1 = k \times (\sqrt{x} - 1)$
			M1	for setting up an appropriate equation in x, eg $1/(\sqrt{x} - 1) = (\sqrt{x} + 1)/1$
			C1	for convincing argument to show $x = 2$
(b)		Shown	M1	for expressing the relationship between the common ratio, one of the first three terms of the sequence and the fifth term, eg 5^{th} term = 3^{rd} term × (common ratio)^2
			C1	for a complete explanation to include eg, $(\sqrt{2} + 1)(\sqrt{2} + 1)^2 = 7 + 5\sqrt{2}$

Q14

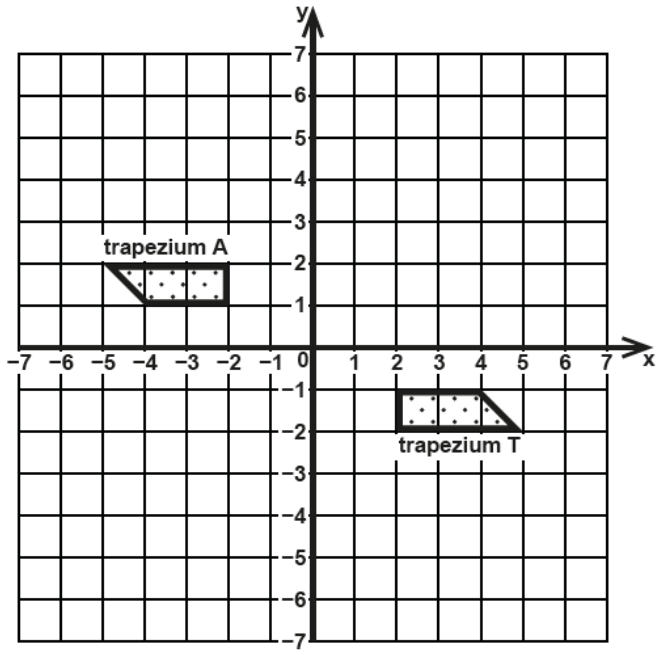


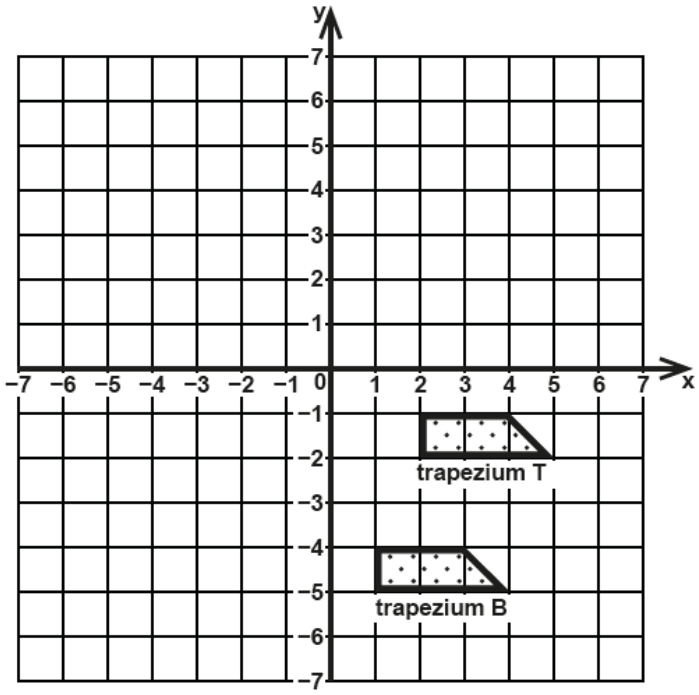
Modifications to the mark scheme for Modified Large Print (MLP) papers.

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

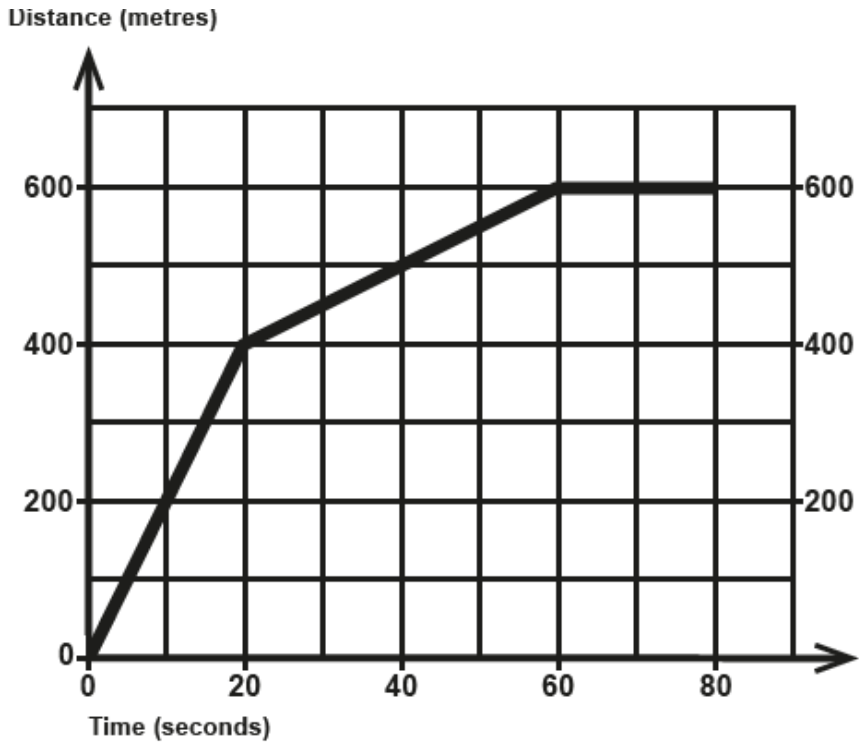
The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:
Angles: ±5º
Measurements of length: ±5 mm

PAPER: 1MA1_2H			
Question		**Modification**	**Mark scheme notes**
3		Both diagrams enlarged and put on the same page in the diagram book. Wording changed to 'There are 8 points equally spaced on the circumference of the circle, as shown in the diagram for Question 18(a)'. Wording changed to 'Four of the points are moved, as shown in the diagram for Question 18(b)'.	Standard mark scheme

PAPER: 1MA1_2H			
Question		**Modification**	**Mark scheme notes**
5		The grid has been split into two parts for part (a) and part (b).	
5	(a)	Question reversed. Trapezium T and A have been put on a grid. Question wording changed to 'It shows trapezium T and trapezium A given on a grid. Describe the single transformation that maps trapezium T onto trapezium A'. 3 answer lines and have been provided	B1 for "Rotation 180° about the origin"
			

PAPER: 1MA1_2H			
Question		**Modification**	**Mark scheme notes**
5	(b)	Question reversed. Question wording changed to 'It shows trapezium T and trapezium B given on a grid. Write down the vector that translates trapezium T onto trapezium B.' Vector brackets have been provided.	B1 for $\begin{pmatrix} -1 \\ -3 \end{pmatrix}$
			

PAPER: 1MA1_2H			
Question		**Modification**	**Mark scheme notes**
6	(c)	MLP and braille: a changed to e, b changed to f.	Standard mark scheme but for Braille letters changed as indicated.
7		Diagram enlarged. Arrows have been removed from 10cm and 6cm. Wording added 'BC = 10cm, AB = 7.5cm, AD = 24cm. The vertical height of the trapezium is 6cm.'	Standard mark scheme.

PAPER: 1MA1_2H			
Question		**Modification**	**Mark scheme notes**
10		Diagram enlarged. Right axis has been labelled. Graph line moved to go through (20, 400) (60, 600) (80, 600). Axes labels moved to the left of the horizontal axis and above the vertical axis.	Standard mark scheme but in (b) the answer is 20
			

PAPER: 1MA1_2H			
Question		**Modification**	**Mark scheme notes**
11		Diagrams enlarged × 2 but angles have been kept the same size.	Standard mark scheme but P1 areas are 100π and 64π P1 working is $\frac{70}{360}\times\frac{100\pi}{164\pi}$
12		Diagram enlarged. Dashes made longer and thicker.	Standard mark scheme
14		Diagram enlarged. List of inequalities stacked vertically.	Standard mark scheme
17		Numbers on the table have changed from 51 to 50, 36 to 40 and 18 to 15. In (a) grid enlarged.	Standard mark scheme in (a) using amended figures. In (b) M1 for a method to find number of students in interval eg 30 + 50 + 40 + 1/3 × 15 or 150 − 15 − 2/3 × 15 A1 for 125/150 or 0.83 – 0.84 or 83 - 84%
20		Diagram enlarged. Shading has changed to dotty shading. Angle moved outside the angle arc and the angle arc made smaller.	Standard mark scheme
23	(a)	MLP and braille: *x* changed to *y*.	Standard mark scheme but for braille note change of letters.

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