



Pearson

# Mark Scheme (Results)

November 2017

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

## **Edexcel and BTEC Qualifications**

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at [www.edexcel.com](http://www.edexcel.com) or [www.btec.co.uk](http://www.btec.co.uk). Alternatively, you can get in touch with us using the details on our contact us page at [www.edexcel.com/contactus](http://www.edexcel.com/contactus).

## **Pearson: helping people progress, everywhere**

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: [www.pearson.com/uk](http://www.pearson.com/uk)

November 2017

Publications Code 1MA1\_2H\_1711\_MS

All the material in this publication is copyright

© Pearson Education Ltd 2017

## 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

<b>M</b>	method mark awarded for a correct method or partial method
<b>P</b>	process mark awarded for a correct process as part of a problem solving question
<b>A</b>	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)
<b>C</b>	communication mark
<b>B</b>	unconditional accuracy mark (no method needed)
<b>oe</b>	or equivalent
<b>cao</b>	correct answer only
<b>ft</b>	follow through (when appropriate as per mark scheme)
<b>sc</b>	special case
<b>dep</b>	dependent (on a previous mark)
<b>indep</b>	independent
<b>awrt</b>	answer which rounds to
<b>isw</b>	ignore subsequent working





Paper: 1MA1/2H				
Question	Working	Answer	Mark	Notes
3 (a)		31.4	P1	for working with circumference formula, eg $\pi \times 80 (=251. \dots)$ oe
			A1	for answer in the range 31.4 to 31.5 accept $10\pi$
(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 <b>A</b>
(b)		(1, -4) (3, -4) (1, -5) (4, -5)	B1	Shape labelled <b>B</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	<p>P1 for using Pythagoras to find length of third side of triangle, eg <math>7.5^2 - 6^2</math> or <math>6^2 + x^2 = 7.5^2</math></p> <p>or uses trigonometry to find angle in triangle, eg <math>\sin A = \frac{6}{7.5}</math> or <math>\cos B = \frac{6}{7.5}</math></p> <p>P1 (dep P1) for complete process to find length of third side of triangle eg <math>\sqrt{7.5^2 - 6^2}</math> or <math>\sqrt{56.25 - 36}</math> or <math>\sqrt{20.25}</math> (= 4.5) or uses trigonometry to find base length of triangle, eg <math>7.5 \times \cos "A"</math> or <math>7.5 \times \sin "B"</math> or <math>\frac{6}{\tan "A"}</math></p> <p>P1 (dep P2) for <math>24 - 10 - "4.5"</math> (= 9.5)</p> <p>P1 (indep) for process to find angle <math>CDA</math>, eg <math>\tan CDA = \frac{6}{\text{base}}</math> from right- angled triangle</p> <p>A1 for answer in the range 32.2 to 32.3</p>	
8 (a)		2.7560...	<p>M1 for 1.0654(059...), 0.1402(633...), 7.5957(541...), 2.756 truncated or rounded to no less than 2dp</p> <p>A1 for 2.7560(...)</p>	
(b)		2.76	<p>B1 for 2.76 ft from (a)</p>	

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

Paper: 1MA1/2H				
Question	Working	Answer	Mark	Notes
12		15	P1 P1 A1	for a process to find the interior or exterior angle of a regular 12 sided polygon e.g. $\frac{10 \times 180}{12}$ (= 150) or $\frac{360}{12}$ (= 30), must be no contradictions for process to find angle <i>STR</i> , eg $\frac{180 - "150"}{2}$ or $\frac{"30"}{2}$ cao
13 (a)		58600	M1 A1	for a complete method, eg $50000 \times 1.02^8$ (= 58582(.969...)) or for finding the increase in value of the company after 8 years, eg 8582(.969...) or 8600 cao
(b)		4.5	P1 P1 A1	for a process to find multiplier for 6 year period, eg $325 \div 250$ oe (= 1.3) or 130(%) or for $250000 \times y^6 = 325000$ for a process to find multiplier for one year, eg (" $1.3$ ") $^{\frac{1}{6}}$ or 1.044...or 1.045 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)  (b)		No with reason  66	C1  M1  A1	for “no” with reason, eg Tracey should multiply 8 and 7 for starting a method to find number of games played, eg $12 \times 11 (= 132)$ 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  M1  A1  C1	for a method to find coordinates of $M(-1, -1)$ or $N(3, 1)$  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 $PR$  for gradients of $MN$ and $PR$ , ie $\frac{1}{2}$ or 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 $PR$  for conclusion from reasoning and correct working

**Paper: 1MA1/2H**

Question	Working	Answer	Mark	Notes
20		68.5	B1  P1  P1  P1  A1	for angle $OAB = 90^\circ$ or angle $OCB = 90^\circ$ , may be seen on diagram  for a process to find the length of $AB$ or the length of $CB (= 10\sqrt{3}$ oe) eg $10 \times \tan 60^\circ (= 17.3\dots)$ or the length of $OB (= 20)$ , eg $10 \div \cos 60^\circ$  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)  for a process to find the area of the sector $OAC$ e.g. $\frac{1}{3} \times \pi \times 10^2 (= 104.7\dots)$ , accept rounded or truncated to 3 significant figures or more  for 68.4 – 68.6

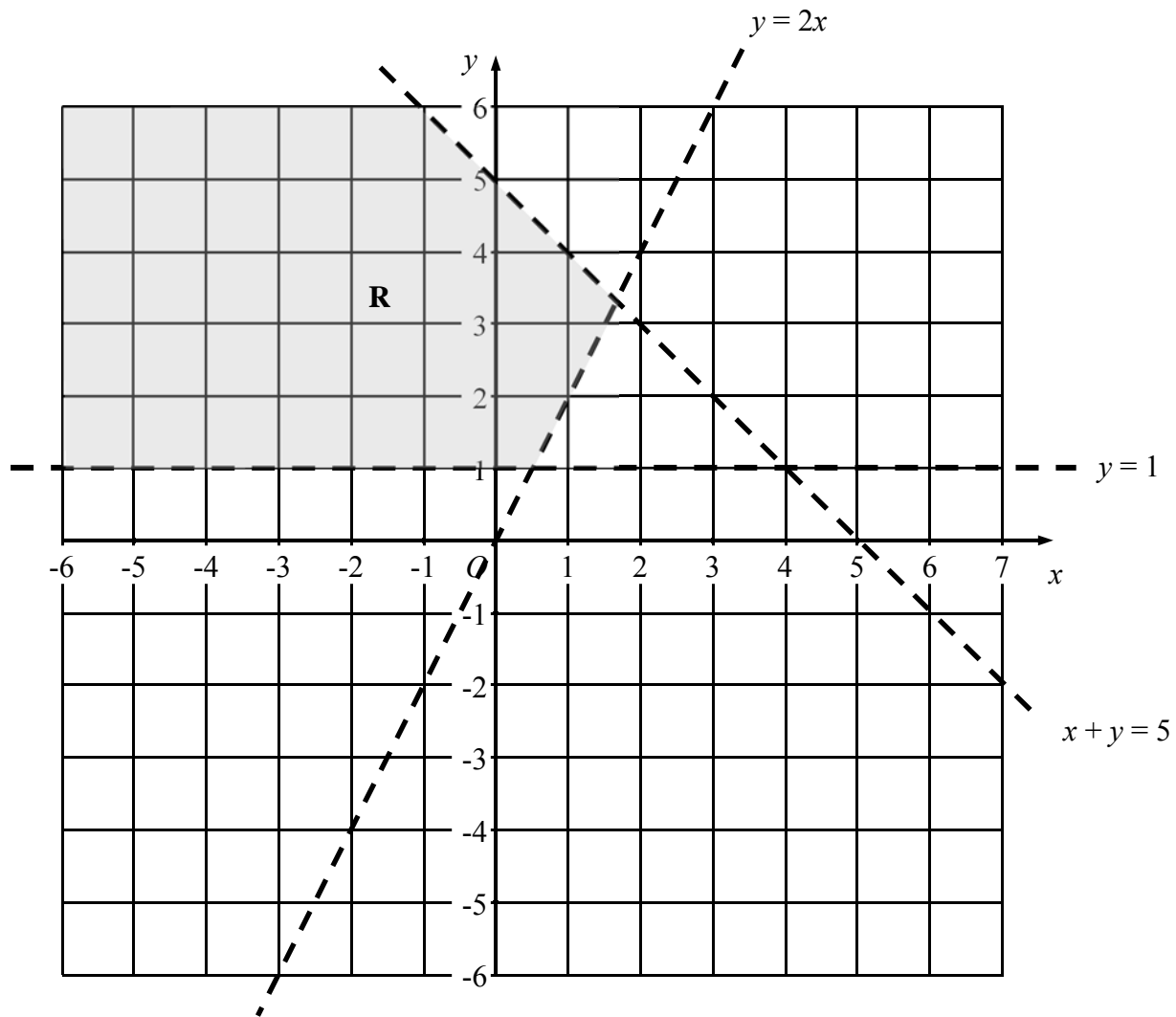


**Paper: 1MA1/2H**

Question	Working	Answer	Mark	Notes
21 (a)		$\frac{1}{55}$	M1	for $\frac{4}{12} \times \frac{3}{11} \times \frac{2}{10}$
(b)		Conclusion (supported)	A1	for $\frac{1}{55}$ oe
			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 $5^{\text{th}} \text{ term} = 3^{\text{rd}} \text{ term} \times (\text{common ratio})^2$
			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:  $\pm 5^\circ$

Measurements of length:  $\pm 5$  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"
	<p>The diagram shows a coordinate grid with x and y axes ranging from -7 to 7. Two trapeziums are plotted: trapezium A and trapezium T. Trapezium A is in the upper-left quadrant with vertices at (-5, 2), (-4, 2), (-4, 1), and (-2, 1). Trapezium T is in the lower-right quadrant with vertices at (2, -2), (3, -2), (4, -1), and (4, -2). The grid is split into two parts by the x-axis.</p>	

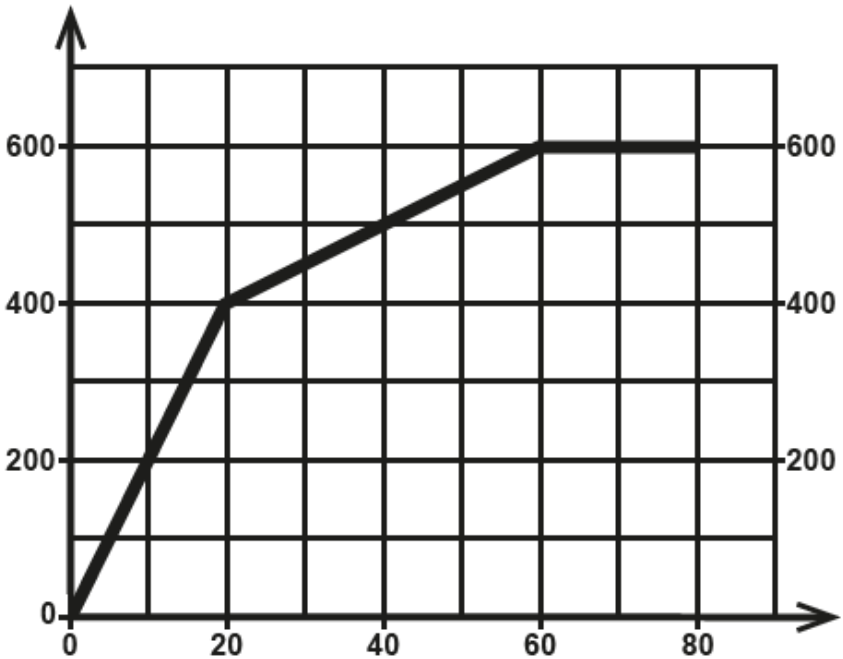
**PAPER: 1MA1\_2H**

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 $\begin{pmatrix} -1 \\ -3 \end{pmatrix}$
	<p>The diagram shows a coordinate grid with x and y axes ranging from -7 to 7. Two trapeziums are plotted: trapezium T and trapezium B. Trapezium T has vertices at (2, -1), (4, -1), (4, -2), and (3, -2). Trapezium B has vertices at (2, -4), (4, -4), (4, -5), and (3, -5). Both trapeziums are shaded with a stippled pattern.</p>	

<b>PAPER: 1MA1_2H</b>			
<b>Question</b>		<b>Modification</b>	<b>Mark scheme notes</b>
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**

<b>Question</b>	<b>Modification</b>	<b>Mark scheme notes</b>										
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										
	<p data-bbox="436 502 649 534"><b>Distance (metres)</b></p>  <table border="1" data-bbox="448 542 1288 1204"><caption>Data points from the distance-time graph</caption><thead><tr><th>Time (seconds)</th><th>Distance (metres)</th></tr></thead><tbody><tr><td>0</td><td>0</td></tr><tr><td>20</td><td>400</td></tr><tr><td>60</td><td>600</td></tr><tr><td>80</td><td>600</td></tr></tbody></table>	Time (seconds)	Distance (metres)	0	0	20	400	60	600	80	600	
Time (seconds)	Distance (metres)											
0	0											
20	400											
60	600											
80	600											

PAPER: 1MA1_2H		
Question	Modification	Mark scheme notes
11	Diagrams enlarged $\times 2$ but angles have been kept the same size.	Standard mark scheme but P1 areas are $100\pi$ and $64\pi$ 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 $30 + 50 + 40 + \frac{1}{3} \times 15$ or $150 - 15 - \frac{2}{3} \times 15$ A1 for $125/150$ or $0.83 - 0.84$ or $83 - 84\%$
20	Diagram enlarged. Shading has changed to dotted 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.



