

Mark Scheme (Results)

November 2020

Pearson Edexcel GCSE 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.

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 (eg 3.5 – 4.2) then this is inclusive of the end points (eg 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 eg  $2 \times 6$  (=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 eg " $12'' \times 50$ ; 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.

#### Word in square brackets

Where a word is used in square brackets eg [area]  $\times$  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: 1MA	Paper: 1MA1/2H						
Question	Answer	Mark	Mark scheme	Additional guidance			
1 (a)	2×2×3×7	M1	for a complete method to find prime factors, could be shown on a factor tree, with no more than one arithmetic error <b>or</b> for 2, 2, 3, 7	Condone the use of 1			
		A1	for $2 \times 2 \times 3 \times 7$ oe	Accept $2^2 \times 3 \times 7$			
(b)	420	M1	for at least 3 multiples of both 60 and 84 (can include 60 and 84)  or finds the prime factors of both 84 (may be seen in (a)) and 60, may be seen in factor trees	60, 120, 180, 240, 300, 360, 420 84, 168, 252, 336, 420 $60 = 2 \times 2 \times 3 \times 5$ or $2^2 \times 3 \times 5$ If factor tree in (a) is incorrect ft this factor tree in part3 (b) for M1 only			
		A1	420 or $2 \times 2 \times 3 \times 5 \times 7$ oe	area in parts (b) for intromy			
2 (a)	Venn diagram	M1	for correct numbers in at least one region	Ignore all entries except the region you are marking for each method mark			
		M1	for correct numbers in at least two regions	4, 6, 8 /2 1			
		A1	for all regions correct	3, 7, 9			
(b)	$\frac{2}{10}$	M1	for $\frac{a}{10}$ where $0 < a < 10$ and $a$ is an integer <b>or</b> $\frac{2}{b}$ where $b > 2$ and $b$ is an integer <b>or</b> ft diagram	Need not be written in correct form at this stage eg could be a ratio 2:10 Repeated digits in the diagram should be counted as 2 elements			
		A1	$\frac{2}{10}$ oe <b>or</b> ft diagram	Accept any equivalent fraction, decimal form 0.2 or percentage form 20%			

Paper: 1MA	1/2H			
Question	Answer	Mark	Mark scheme	Additional guidance
3	No	P1	for $3000 \div (2+3) (=600)$	
	(supported)	P1	for "600" × 2 (= 1200) or "600" × 3 (= 1800) or "600" ÷ 6 (= 100) or "600" ÷ 20 (= 30)	
		P1	for "1200" ÷ 6 (= 200) or "1800" ÷ 20 (= 90) or "100" × 2 (= 200) or "30" × 3 (= 90)	
		P1	for "90" ÷ ("200" + "90") × 100 (= 31.0) oe or "90" ÷ ("200" + "90") (= 0.31) or 0.3 × ("200" + "90") (= 87)oe	Full method to compare
		C1	correct conclusion <b>and</b> fully correct calculations with accurate figure eg No and 87 <b>or</b> No and 31% <b>or</b> No and 0.31	No working, answer only no marks No may be implied by a statement
4 (a)	13, (6), 5, 4, –3	B2	for all 4 values correct	
		(B1	for 2 or 3 correct values)	
(b)	Correct graph	M1	ft (dep on B1) for plotting at least 4 of the points from their table correctly	
		A1	for a fully correct curve drawn	Accept a freehand curve drawn that is not made of line segments Line sections outside the required range can be ignored.

Paper: 1MA	1/2H			
Question	Answer	Mark	Mark scheme	Additional guidance
5	99.5	M1	for $\sin (34) = \frac{x}{178}$ oe  or alternative method to find $x$	
		A1	for answer in range 99.5 to 99.7	If an answer in the range 99.5 to 99.7 is given in the working space then incorrectly rounded, award full marks
6	$\begin{pmatrix} -9\\14 \end{pmatrix}$	M1	for $2 \binom{3}{4} - 3 \binom{5}{-2}$ or $\binom{6}{8}$ and $\binom{15}{-6}$ or $\binom{-9}{y}$ or $\binom{x}{14}$	May be seen in two separate calculations eg $2\times3 + -3\times5$ and $2\times4 + -3\times-2$ Condone incorrect notation if method is clear for this mark only
		A1	cao	
7	35.3	P1	for starting the process to find length of third side of triangle, eg $9^2 - 6^2$ (= 45) or $6^2 + x^2 = 9^2$	
		P1	for $\sqrt{9^2 - 6^2}$ or $\sqrt{81 - 36}$ or $\sqrt{45}$ or $3\sqrt{5}$ (= 6.7) or $r^2 = 45$	
		P1	for stating or using $\pi \times [\text{radius}]^2 \div 4$	[radius] is any value
		A1	for answer in range 35.2 to 35.4	If an answer in the range 35.2 to 35.4 is given in the working space then incorrectly rounded, award full marks No working, answer only, no marks

Paper: 1MA	1/2H			
Question	Answer	Mark	Mark scheme	Additional guidance
8 (a)	580	M1 A1	for method to find value before increase eg $551 \div 0.95$ cao	
(b)	6354.67	M1	for 6000 × 1.024 oe (= 6144)	
		M1	for " $6144$ " × $1.017^2$ oe	$6000 \times 1.024 \times 1.017^2$ scores M2
		A1	for 6354.66 <b>or</b> 6354.67 <b>or</b> 6354.68	If correct answer is stated then subsequently rounded isw and award 3 marks If correct answer stated and then interest only given as the answer award M2A0
9	Two changes	C1	plot the median at 162, not 161 oe	
		C1	Acceptable examples the median has been plotted at 161 / upper quartile at 172 the upper quartile should be 171 (not 172) UQ is wrong as IQR is 17 not 18 Not acceptable examples the median / upper quartile have been plotted / drawn wrong the upper quartile has been worked out incorrectly She needs to work out the UQ	

Paper: 1M.	A1/2H			
Question	Answer	Mark	Mark scheme	Additional guidance
10 (a)	1	B1	cao	
(b)	_ 8	B1	cao	
	$\overline{x-4}$			
(c)	$27n^{12}w^6$	B2	cao	
		(B1	for two of 27, $n^{12}$ , $w^6$ in a product)	
11	Yes (supported)	P1	for process to find number of combinations, eg $5 \times 8$ oe $(= 40)$ or for $240 \div 5$ $(= 48)$ or $240 \div 8$ $(= 30)$ or for $240 \div 5 \div 8$ $(= 6)$ or $5 \times 8 \times x = 240$	
		C1	Yes and 6	
12 (a)	-0.09	M1	for suitable method to find gradient, eg 27 ÷ 300	Any readings from the graph must be reasonable. Condone missing negative for M1
		A1	for answer in the range $-0.1$ to $-0.08$ oe	Condone missing negative for 1411
(b)		C1	for explanation	Can ft explanation linked to incorrect gradient in part (a)
			Acceptable examples	. ,
			volume of petrol used each km litres/km	
			Rate of fuel consumption	
			For every 9 litres you can travel 100 km	
			Not acceptable examples	
			volume ÷ distance	
			volume of petrol used per distance	
			km/litre	
			as distance increases volume decreases	

Paper: 1MA	Paper: 1MA1/2H							
Question	Answer	Mark		scheme	Additional guidance			
13	15.4	M1	for $\frac{AB}{\sin 34} = \frac{23.8}{\sin"120"}$ or $\frac{\sin 34}{AB}$	$=\frac{\sin"120"}{23.8}$	"120" comes from 180 – 26 – 34			
			for $(AB =)$ $\frac{23.8}{\sin"120"} \times \sin 34$		15 264 15 4			
		A1	for answer in range 15.36 to 15.4		If an answer in the range 15.36 to 15.4 is given in the working space then incorrectly rounded, award full marks			
14	116	P1	for setting up an equation, eg $(x + 4)^2 = x^2 + 70$	for setting up an equation, eg $x^2 - (x - 4)^2 = 70$	Equation must be in a single variable.  If a candidate uses a trial and improvement method, it is either full marks or no marks.			
		P1	for process to reduce equation down to a linear equation ready to solve eg $8x = 54$ oe	for process to reduce equation down to a linear equation ready to solve eg $8x = 86$ oe	Candidates must get as far as $ax = b$			
		A1	for 6.75 oe	for 10.75 oe				
		B1	ft (dep P2) for finding the area of B	or for answer in range 115 to 116				
15	Enlargement sf -1.5 centre (1, 1)	B2	for enlargement scale factor –1.5 an	ad centre (1, 1)	Award no marks if more than one transformation is given			
		(B1	for enlargement scale factor –1.5 or	enlargement centre (1, 1))				

Paper: 1MA	1/2H			
Question	Answer	Mark	Mark scheme	Additional guidance
16	$3n^2 + 2n + 5$	M1	for a correct start to a method to find the <i>n</i> th term, eg equal 2nd differences imply a term in $n^2$ for working with $3n^2$ , eg $3n^2$ and sequence 7, 9, 11,	Need to see constant second difference found and $n^2$ $3n^2 + 2n \text{ implies M2}$
		A1	for $3n^2 + 2n + 5$	
17	-12, -7	B1	cao	
18	160π	P1	for process to find curved surface area of cone, eg $\pi \times 10 \times 25 \ (= 250\pi) \ (= 785)$	
		P1	for process to find the radius or diameter of the smaller cone eg $10 \times \frac{15}{25}$ (= 6) or $20 \times \frac{15}{25}$ (= 12) oe  OR uses area scale factor, eg "250 $\pi$ " × $\left(\frac{15}{25}\right)^2$ (= 90 $\pi$ )  for a complete process, eg "250 $\pi$ " – $\pi$ × "6" × 15 (= 785 – 282) or answer in range 502 to 503	$\frac{15}{25}$ may be seen as 0.6
		A1	for $160\pi$	Award 0 marks for an answer of $160\pi$ or an answer in range 502 to 503 with no supportive working. If $160\pi$ seen but answer in range 502 to 503 given on answer line isw and award full marks

Paper: 1MA	1/2H			
Question	Answer	Mark	Mark scheme	Additional guidance
19	788.4	P1 P1 P1	for substituting values, eg $1040 = K \times 1200 + 20$ for process to find $K$ , eg $(1040 - 20) \div 1200$ oe $(= 0.85)$ for complete process, eg $0917$ : " $0.85$ " × $1040 + 20$ (= $904$ ); $0918$ : " $0.85$ " × " $904$ " + $20$	
20 (a)	Shown	M1	for 788.4 or 788 or 789  for $\frac{n}{n+8}$	
		M1	forms equation and clears fractions, eg $10n = 7n + 56$ or $10n + 3(n + 8) = 10(n + 8)$ or equates $\frac{3}{10} = \frac{8}{x}$ or $\frac{3}{10} = \frac{8}{n+8}$	
		C1	or continues to work with ratios, eg 3:7 = 24:56  gives the total sweets eg $\frac{80}{3}$ oe or number of red sweets $n = \frac{56}{3}$ oe or gives number of red as $\frac{56}{3}$	Does not have to restate the $\frac{7}{10}$ ; giving a different probability will suffice
			OR award 3 marks for a complete written argument, eg, $P(y) = \frac{3}{10}$ and there are 8 yellows. This cannot work as 3 is not a factor of 8 (and $\frac{3}{10}$ is in its simplest form)	

Paper: 1MA	1/2H			
Question	Answer	Mark	Mark scheme	Additional guidance
20 (b)	28	P1	for $\frac{n}{n+8}$ and $\frac{n-1}{n+7}$ oe	
		P1	forms an appropriate equation, eg $\frac{n}{n+8} \times \frac{n-1}{n+7} = \frac{3}{5}$	Note we do not need to see "= 0"; just the
			for correctly forming a quadratic ready for solving, eg $an^2 + bn + c$ (= 0), $2n^2 - 50n - 168$ (= 0), $n^2 - 25n - 84$ (= 0) oe	LHS is sufficient.
		P1	process to solve quadratic equation, ft a 3 term quadratic factorising eg $(n + 3)(n - 28)$ (=0) oe <b>or</b> completing the square <b>or</b> correct use of formula $ eg \frac{25 \pm \sqrt{25^2 - 4 \times -84}}{2}, \frac{50 \pm \sqrt{50^2 - 4 \times 2 \times -168}}{2 \times 2} $	
		A1	cao	Award 0 marks for a correct answer with no supportive working.

Paper: 1MA	1/2H			
Question	Answer	Mark	Mark scheme	Additional guidance
21 (a)	Graph drawn	C2	for graph reflected in the y-axis	Key points: (0, 0), (1, 2), (2, 1), (3, 0), (4, 2) Award C1 if line segments but goes through all key points
		(C1	for a graph reflected in the <i>x</i> -axis  or for a correct graph through four of the five key points)	
(b)	y = 5 + 2(x - 3) -	C2	for $y = 5 + 2(x - 3) - (x - 3)^2$ oe eg $y = -x^2 + 8x - 10$ , $y = -[(x-4)^2 - 6]$	For either C mark accept equivalent
	$y = 5 + 2(x - 3) - (x - 3)^2$	(C1	for $y = 5 + 2(x + 3) - (x + 3)^2$ or $y = 5 + 2(x - a) - (x - a)^2$ , $a \ne 3$ , $a \ne 0$ ) or $y = f(x - 3)$ or $y = (x - 4)^2 + 6$ or correct expression missing " $y =$ "	expressions If a correct answer for C2 is given and is then incorrectly simplified, award C1 a need not be positive

Paper: 1MA	Paper: 1MA1/2H						
Question	Answer	Mark	Mark scheme	Additional guidance			
22	$x^2 + y^2 = 80$	P1	for process to find gradient of tangent eg $\frac{10-0}{020}$ (= $\frac{1}{2}$ )  or for $20^2 + 10^2$ (= 500)  or start to method to find angle between tangent and $x$ axis,  eg $\tan\theta = \frac{10}{20}$				
		P1	for process to find gradient of normal/radius eg $\frac{-1}{"0.5"}$ (=-2) or for $\sqrt{20^2 + 10^2}$ or $\sqrt{500}$ or 22.36 or 22.4 or completes process to find angle between tangent and $x$ axis. eg $\theta = \tan^{-1}\left(\frac{10}{20}\right)$ (=26.565)				
		P1	for equation of tangent eg $y = "0.5"x + 10$ oe or for equation of radius eg $y = "-2"x$ oe or for using similar triangles eg $\frac{r}{10} = \frac{20}{"\sqrt{500}"}$ or for $\sin("26.565) = \frac{r}{20}$				
		P1	for process to find the <i>x</i> coordinate eg "0.5" $x + 10 =$ "-2" $x (x = -4)$ or for $r = \frac{20}{\sqrt{500}} \times 10$ or $r = 20 \times \sin(\text{``26.565''})$ oe	Accept $(4\sqrt{5})^2$ for 80			

# 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: ±50

Measurements of length: ±5 mm

PAPE	PAPER: 1MA1/2H							
Que	stion	Modification	Mark scheme notes					
2		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					
4	(a)	Wording added "There are four spaces to fill." Table enlarged and turned to vertical format.	Standard mark scheme					
4	(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					
5		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					
7		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.						

PAPER: 1MA1/2H						
<b>Question</b> Modification		lification	Mark scheme notes			
9	Wording added "Look at the diagram for Question 9 in the Diagram Book. It shows a box plot." Wording added "She used her results to work out the information in the table below." Table values changed as shown:		Standard mark scheme but with the numerical values changed: C1 plot the median at 162, not 160 oe C1 plot the upper quartile at 175, not 172 oe			
	Least height	140 cm				
	Lower quartile	155 cm				
	Interquartile range	17 cm				
	Median	162 cm				
	Range	40 cm				
	Wording "Aisha drew this box plot" removed Diagram Book" Diagram enlarged. Axis lab Box plot values changed as below: Least height: 140; Lower quartile: 155; Media					
12	Wording added "Look at the diagram for Question 12 in the Diagram Book."  Wording "The graph gives information" removed and replaced with "It shows a graph which gives information" Diagram enlarged. Graph line made thicker. Right axis has been labelled. Axes labels moved to the left of the horizontal axis and to the top of the vertical axis.		Standard mark scheme but in part (a) allow some leeway in the award of the A mark.			

PAPER: 1MA1/2H				
Question Modification		Modification	Mark scheme notes	
13		Wording added "Look at the diagram for Question 13 in the Diagram Book."  Wording "Here is triangle ABC" removed and replaced with "It shows a triangle ABC.  Diagram enlarged. Angle ACB = 34° Angle ABC = 26° CB = 23.8 cm".  Angles moved outside of the angle arcs, and the arcs has been made smaller.	Standard mark scheme	
14		Wording added "Look at the diagram for Question 14 in the Diagram Book." Diagram enlarged. Wording "Here are two squares, A and B" removed, replaced with "It shows two squares, A and B." Labels removed and replaced with "square A" and "square B" above the squares.	Standard mark scheme	
15		Two labelled cut out shapes provided for all candidates. The grid reduced in size and cut at $x = 6$ and $y = -6$ . Wording added "Look at the diagram for Question 15 in the Diagram Book. It shows triangle A and triangle B on a grid. Two cut out shapes may be available if you wish to use them." Diagram enlarged. Shading changed to dotty shading. Shape outlines made thicker. Shapes labelled "triangle A" and "triangle B". Labels moved above the shapes.	Standard mark scheme	

PAPER: 1MA1/2H					
Question		Modification	Mark scheme notes		
18		Model provided for all candidates.  Wording added "Look at the two diagrams for Question 18. You may be provided with a model."  "The diagram represents a solid cone" removed and replaced with "Diagram 1 and the model represent a solid cone. Diagram 2, below Diagram 1, shows a 2D view of the cone."  Diagram enlarged. Diagram 2 provided as a 2D representation of the cone.  Grey shading removed and replaced with dotty shading.  The diagrams labelled 'painted grey' where it is shaded. Dashed lines longer and thicker.	Standard mark scheme		
21	(a)	Wording added "Look at the diagram for Question 21(a) in the Diagram Book." Wording "The graph of the curve with equation is shown on the grid below" removed and replaced with "It shows the graph of the curve with equation on a grid." Diagram enlarged. Curve made thicker. Wording "On the grid above," removed and replaced with "On the same grid,"	Standard mark scheme		
21	(b)	Wording added "Look at the diagram for Question 21(b) in the Diagram Book."  Diagram enlarged. Curves made thicker. Crosses changed to solid dots/circles.	Standard mark scheme		