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Mark Scheme (Results)

November 2023

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.

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 (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 × 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" × 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 eg [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 (a)	$13y - 1$	M1	for method to expand one bracket or collect like terms, eg $3 \times 2y - 3 \times 5$ ($= 6y - 15$) **or** $7 \times y + 7 \times 2$ ($= 7y + 14$) **or** $3 \times 2y + 7 \times y$ ($= 6y + 7y$) **or** $3 \times -5 + 7 \times 2$ ($= -15 + 14$)	May be implied by $13y$ **or** -1
		A1	oe	
(b)	$3x(2x + 5)$	B2	oe	
		(B1	for $3(2x^2 + 5x)$ **or** $x(6x + 15)$ **or** $3x(ax + b)$)	
(c)	$g = \frac{f - 11}{3}$	M1	for correct first step to rearrange, eg $f - 11 = 3g + 11 - 11$ **or** $f - 11 = 3g$ **or** $\frac{f}{3} = \frac{3g}{3} + \frac{11}{3}$ **or** $-3g = 11 - f$ **or** answer ambiguously shown, eg $g = f - 11 \div 3$ **or** given as $\frac{f - 11}{3}$	May be seen in different equivalent forms
		A1	oe	
2	35	P1	for process to find income and outgoings, eg $7.5(0) \times 54$ ($= 405$) **and** $100 + 120 + 80$ ($= 300$)	
		P1	For process to find the profit, eg "405" **–** "300" ($= 105$) **or** "405" ÷ "300" ($= 1.35$) **or** "405" ÷ "300" × 100 ($= 135$)	
		P1	for a full process to find percentage profit, eg ("105" ÷ "300") ×100 **or** ("1.35" – 1) × 100 **or** "135" − 100	
		A1	cao	

Paper: 1MA1/2H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
3	4811.20	M1 A1	for a full method for one year, eg 4500×1.034 (= 4653) oe **OR** for a full method for 2 years, eg 4500×1.034^2 oe for 4811.2(0)	Can be implied by 4806 or 9306 Accept 4811.202 and 4811.21
4	11	M1 M1 A1	for one correct step to isolate x term or constant term on one side, eg adds x to both sides to get $5x - 14 + x = 52 - x + x$ **or** adds 14 to both sides to get $5x - 14 + 14 = 52 - x + 14$ oe for both correct steps to isolate terms in x on one side and constant term on one side, eg "$6x$" $- 14 + 14 = 52 + 14$, **or** $5x + x =$ "66" $+ x - x$ cao	May be seen in different equivalent forms but must be carried out, not just intention seen. Can be implied by eg $4x = 66$ or $6x = 38$
5	21	P1 P1 P1 A1	for process to work correctly with initial ratio, eg $120 \div 4 \times 9$ (= 270) **or** $90 + 120 + 60$ (= 270) for process to find the value of 1 part in the new ratio, eg "270" $\div (2 + 5 + 3)$ (= 27) for complete process to find both values for Errol, eg "27" $\times 3$ (= 81) **and** $120 \div 4 \times 2$ (= 60) cao	Can be implied by 90 : 120 : 60 or by a second ratio that totals 270
6	327	M1 A1	for $147 + 180$ or for $360 - (180 - 147)$, **or** for drawing a suitable diagram with 147 in the correct position and with the bearing of A from B indicated cao	Diagram can be a sketch

Paper: 1MA1/2H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
7	65	P1	for a full process to find the volume of the container, eg $\pi \times 15^2 \times 43$ (= 30 394.9…)	These steps may be completed in a different order Accept 9675π
		P1	for a process to convert between cm^3 and litres, eg "30 394.9…" ÷ 1000 (= 30.39…) **or** [volume] ÷ 1000 **or** 0.47×1000 (= 470)	Accept 9.675π or $\frac{387}{40}\pi$
		P1	for a process to find the time taken, eg [volume] ÷ 0.47 or [volume] ÷ "470"	[volume] can be any value they believe to be the volume that might have been incorrectly converted (or not at all)
		A1	answer in the range 64.6 to 65	If an answer is given in the range in working and then rounded incorrectly award full marks.
8	$1.85 \leq x < 1.95$	B1	for 1.85 in correct position	
		B1	for 1.95 in correct position	Accept $1.94\dot{9}$ or 1.9499(…)
9	$x^3 + 8x^2 + x - 42$	M1	for a method to find the product of two linear expression (3 out of 4 terms correct or 4 correct terms ignoring signs), eg $x^2 - 2x + 7x - 14$ or $x^2 + 3x - 2x - 6$ or $x^2 + 3x + 7x + 21$	Note that (eg) $5x - 14$ in expansion of $(x + 7)(x - 2)$ is to be regarded as 3 correct terms.
		M1	for a complete method to obtain all terms, half of which are correct (ft their first product), eg $x^3 + 3x^2 - 2x^2 + 7x^2 - 6x + 21x - 14x - 42$	First product must be quadratic with at least 3 terms but need not be simplified or may be simplified incorrectly
		A1	cao	

Paper: 1MA1/2H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
10 (a)	0.13, 0.94, 0.06, 0.73, 0.27	B2 (B1	for all values correctly placed for at least 2 correct values placed)	
(b)	0.9649	M1 M1 A1	(ft their diagram) for one correct product, eg 0.87 × 0.94 (= 0.8178) **or** 0.87 × 0.06 (= 0.0522) **or** 0.13 × 0.73 (= 0.0949) **or** 0.13 × 0.27 (= 0.0351) for a full method, eg "0.8178" + "0.0522" + "0.0949" **or** 1 – "0.0351" for 0.9649, 96.49% or $\frac{9649}{10000}$	Allow values that are truncated or rounded as long as the intention is clear.
11	D A B C	B2 (B1	for all correct for at least 2 correct)	
12	6.4	P1 P1 A1	for a suitable start to the process, eg, $M = \left(\frac{7-3}{2}, \frac{13+21}{2}\right)$ (= (2, 17)) **or** $N = \left(\frac{15-3}{2}, \frac{23+21}{2}\right)$ (= (6, 22)) (dep on P1) for a correct first step using of Pythagoras, eg $\left(x_N - x_M\right)^2 + \left(y_N - y_M\right)^2$ eg ("6" – "2")^2 + ("22" – "17")^2 (= 41) for answer in the range 6.4 to 6.41	Condone missing brackets on coordinates Ignore units throughout If an answer is given in the range in working and then rounded incorrectly award full marks.

Paper: 1MA1/2H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
13	Proof	M1	for eg, ($10x$ =) 0.723723… **or** ($100x$ =) 7.237237… **or** ($1000x$ =) 72.372372… **or** ($10000x$ =) 723.723723…	Any recurring notation acceptable throughout. Proofs with terminating decimals (less than 6 figures) score M1M1A0
		M1	(dep M1) for a method using two recurring decimals that leads to a terminating decimal difference, using correct multiples of x eg ($10000x - 10x$ =) 723.723723… − 0.723723…	
		A1	for completing the algebra to $\frac{241}{3330}$ oe	
14	0.48	P1	for setting up an equation with a constant term, eg $y = kx^2$ **or** $x = \frac{j}{w}$	Condone the use of "$\propto$" instead of "=" for the first two P marks Equation can be implied by correct substitution
		P1	for a process to substitute values in one equation, eg $3 = k \times 0.5^2$ or $k = 12$ **or** $2 = j \div 0.2$ or $j = 0.4$	
		P1	(dep P2) for combining the two equations ft their values of k and j eg $y =$ "12" $\times \left(\frac{"0.4"}{w}\right)^2$ oe **OR** for correct process to find the value of x when $w = 2$, eg $x =$ "0.4" $\div 2$ (= 0.2)	$y = \frac{1.92}{w^2}$
		P1	for substitution into their formula, eg $y = \frac{"1.92"}{2^2}$ **OR** for using found value of x to find the value of y, eg $y =$ "12" $\times$ "0.2"^{2}	
		A1	oe	

Paper: 1MA1/2H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
15 (a)	3	B1	for 3 correctly placed in the first row	
(b)	Correct bars	B2	for both bars correct, heights of 4.5 and 1.4	
		(B1	for one bar correct out of a maximum of 2 bars)	
(c)	18.5	M1	for finding the area of at least 2 bars eg, 2 × 2 (= 4) **or** 4 × 2 (= 8) **or** 4 × 4 (= 16) **or** 2 × 6.5 (= 13) **or** 4 × 0.5 (= 2)	Condone 1 error in reading fd values or measurements.
		M1	for ("43" + 1) ÷ 2 (= 22) **and** 10 ÷ 16 × 4 (= 2.5) **or** "43" ÷ 2 (= 21.5) **and** 9.5 ÷ 16 × 4 (= 2.375)	
		A1	For 18.5 or 18.375	
16	56.0	P1	for $\frac{BD}{\sin(112)} = \frac{7.9}{\sin(42)}$	
		P1	for complete process to find *BD*, eg $(BD =) \frac{7.9}{\sin(42)} \times \sin(112)$ (= 10.9…)	Values may be rounded or truncated.
		P1	for area = $\frac{1}{2}$ × [*BD*] × 15.3 × sin (42)	[*BD*] must be clearly identified
		A1	for answer in the range 56.0 to 56.1 SCB2 for BD = 10.9… if no marks are awarded.	If an answer is given in the range in working and then rounded incorrectly award full marks.

Paper: 1MA1/2H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
17 (a)	Shown	M1	For a start to establish at least one root in [1,2], eg substitutes $x = 1$ or $x = 2$ into LHS, eg $1^3 + 2 \times 1 - 6$, or $2^3 + 2 \times 2 - 6$	$f(x) = x^3 + 2x - 6$ $f(1) = -3$ $f(2) = 6$
		C1	For a complete argument, eg evaluates for both values of x and states since there is a sign change there must be at least one root in $1 < x < 2$ (as f is continuous)	
(b)	Shows re-arrangement	C1	for showing re-arrangement; must see $x^3 + 2x - 6 = 0$ leading to $x(x^2 + 2) - 6 = 0$ **or** $x(x^2 + 2) = 6$ or $x = \frac{6}{x^2 + 2}$ leading to $x^3 + 2x = 6$	
(c)	1.4496	M1	for $x_1 = \frac{6}{1.45^2 + 2}$ (=1.462(522851…))	
		M1	for $x_2 = \frac{6}{"1.462(52...)"^2 + 2}$ (=1.449634937)	
		A1	for answer in the range 1.4496 to 1.4497	If a correct value is given and then rounded or rounded incorrectly award full marks.

Paper: 1MA1/2H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
18	Proof	B1	for $\overrightarrow{EH} = -\mathbf{b} + \mathbf{a}$ **or** $\overrightarrow{HE} = -\mathbf{a} + \mathbf{b}$ **or** $\overrightarrow{HG} = \mathbf{a} + \mathbf{c}$ **or** $\overrightarrow{GH} = -\mathbf{c} - \mathbf{a}$	
		B1	for $\overrightarrow{BC} = -2\mathbf{b} + 2\mathbf{a} + 2\mathbf{c}$ **or** $\overrightarrow{CB} = 2\mathbf{b} - 2\mathbf{a} - 2\mathbf{c}$	
		B1	for $\overrightarrow{EF} = \mathbf{b} + \frac{1}{2}(-2\mathbf{b} + 2\mathbf{a} + 2\mathbf{c})$ $(= \mathbf{a} + \mathbf{c})$ **or** $\overrightarrow{FE} = \frac{1}{2}(2\mathbf{b} - 2\mathbf{a} - 2\mathbf{c}) - \mathbf{b}$ $(= -\mathbf{a} - \mathbf{c})$ **or** $\overrightarrow{FG} = \frac{1}{2}(-2\mathbf{b} + 2\mathbf{a} + 2\mathbf{c}) - \mathbf{c}$ $(= -\mathbf{b} + \mathbf{a})$ **or** $\overrightarrow{GF} = \mathbf{c} + \frac{1}{2}(2\mathbf{b} - 2\mathbf{a} - 2\mathbf{c})$ $(= -\mathbf{a} + \mathbf{b})$	
		A1	for completing proof, $\overrightarrow{EH} = \overrightarrow{FG}$ **or** $\overrightarrow{HG} = \overrightarrow{EF}$ (so *EFGH* is a parallelogram)	
19 (a)	17	M1	For $\left(\text{gf}\left(x\right)=\right)2\left(2x+3\right)^2-1$ **or** $\left(\text{gf}\left(x\right)=\right)8x^2+24x+17$ **or** $2(2 \times (-3) + 3)^2 - 1$	Substitution may be seen in 2 steps
		A1	cao	
(b)	$\frac{x+1}{2}$	M1	for a suitable first step, eg adds 1 to both sides, eg $y + 1 = 2x$ **or** $x + 1 = 2y$ **or** $g(x) + 1 = 2x$ **or** $x = \frac{y+1}{2}$	
		A1	oe	

Paper: 1MA1/2H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
20	$\frac{6x+37}{6x-42}$	P1	for factorising to get the numerator, eg $(x + 4)(2x – 14)$ or $2(x + 4)(x – 7)$ or $(2x + 8)(x – 7)$	P marks can be awarded in any order
		P1	For process to work with the division by $\frac{2x^2-6x-56}{2x+3}$ eg multiplies by $\frac{2x+3}{2x^2-6x-56}$	
		P1	for two correct fractions with a common denominator, eg $\frac{28}{6(x-7)}$ and $\frac{6x+9}{6(x-7)}$ oe **or** $\frac{28+6x+9}{6(x-7)}$ oe	
		A1	oe or $a = 6$, $b = 37$, $c = 6$, $d = -42$	
21	98	P1	for (total number of gold =) $6x − 3$	
		P1	for forming an equation, eg $\frac{x}{6x-3}=\frac{2}{11}$	
		P1	(dep on P2) for correct substitution of their value into all expressions, eg $7\times"6"-11+"6"+5\times"6"-3(=64)$	
		A1	98	

PAPER: 1MA1_2H			
Question		**Modification**	**Mark scheme notes**
1	(c)	Letter ‘f’ changed to ‘p’. Letter ‘g’ changed to ‘q’.	Standard mark scheme but note change of letter
7		Wording added ‘Look at the diagram for Question 7 in the Diagram Booklet. You may be provided with a model. They show’. Wording removed ‘The diagram shows’. Diagram enlarged. Radius and height labels moved to the left. Dashed lines made longer and thicker.	Standard mark scheme
9		Letter ‘x’ changed to ‘y’.	Standard mark scheme but note change of letter
10		Wording added ‘Look at the diagram for Question 10 in the Diagram Booklet. It shows an incomplete probability tree diagram.’ Wording added ‘There are five spaces to fill.’ In (a) wording added ‘in the Diagram Booklet’. Diagram enlarged. Braille: Diagram enlarged with missing answers labelled (i), (ii), (iii), (iv), (v). For Braille add ‘Ans: (i)___ (ii)___ (iii)___ (iv) ___ (v) ___	Standard mark scheme
11		Wording added ‘Look at the diagram for Question 11 in the Diagram Booklet. It shows four graphs.’ Diagrams enlarged. Titles moved above each graph. Axis labels moved to the top of the vertical axis and to the right of the horizontal axis. Open headed arrows. Table enlarged and left aligned. Wording added ‘There are four spaces to fill.’ For Braille: ‘Match each type of probability in the list below to the correct graph.’ Remove table and make a list adding in (i) Graph ____, (ii) Graph ____, etc.	Standard mark scheme

PAPER: 1MA1_2H			
Question		**Modification**	**Mark scheme notes**
15	(a), (b)	Wording added ‘Look at the diagram for Question 15(a) and 15(b) in the Diagram Booklet. It shows an incomplete histogram.’ Wording added ‘below’. Wording added ‘in the Diagram Booklet’. Table enlarged and left aligned. Values in the table changed: Range ‘$16 < t \leq 19$’ changed to ‘$16 < t \leq 20$’ Range ‘$19 < t \leq 21$’ changed to ‘$20 < t \leq 22$’ Range ‘$21 < t \leq 26$’ changed to ‘$22 < t \leq 26$’ Value ‘15’ changed to ‘18’ Value ‘7’ changed to ‘6’. Grid lines changes on the grid to go up in increments of 4 on the x axis. Diagram enlarged. Axis labels moved to the top of the vertical axis and to the left of the horizontal axis. Open headed arrows. Shading changed. Right axis labelled. Third bar changed width and height to match modified values. Grid cut at x = 28. Wording added ‘There is one space to fill.’	(a) Standard mark scheme (b) bars of height 9 cm and 3 cm (c) Standard mark scheme
15	(c)	Wording added ‘Look at the diagram for Question 15(c) in the Diagram Booklet. It is a histogram giving’. Wording removed ‘The histogram below gives’. Grid lines changes on the grid to go up in increments of 4 on the x axis. Right axis labelled. Diagram enlarged. Shading changed. Open headed arrows. Grid cut at x = 28. Axis labels moved to the top of the vertical axis and to the left of the horizontal axis.	Standard mark scheme
16		Wording added ‘Look at the diagram for Question 16 in the Diagram Booklet. It shows trapezium ABCD.’ Wording removed ‘ABCD is a trapezium.’ Wording added ‘AB = 7.9 cm BC = 15.3 cm Angle BAD = 112° Angle ADB = 42°’ Diagram enlarged. Angles moved outside of angle arcs and angle arcs made smaller.	Standard mark scheme

PAPER: 1MA1_2H			
Question		**Modification**	**Mark scheme notes**
18		Wording added ‘Look at the diagram for Question 18 in the Diagram Booklet. It shows quadrilateral ABCD.’ Wording removed ‘ABCD is a quadrilateral.’ Diagram enlarged. EFGH joined with dashed lines.	Standard mark scheme
21		Wording added ‘Look at the diagram for Question 21 in the Diagram Booklet. It shows a Venn diagram.’ Diagram enlarged. ‘34’ moved left in the Venn diagram. Circles A and B labelled ‘set A’ and ‘set B’.	Standard mark scheme

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