



Pearson
Edexcel

Mark Scheme (Results)

November 2022

Pearson Edexcel GCSE
In Mathematics (1MA1)
Higher (Non-Calculator) Paper 1H

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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 $2 \times 6 (=12)$ 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.

13 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: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
1	$2^2 \times 5^3$	M1	for a complete method to find prime factors, could be shown on a complete factor tree with no more than one error or by division by prime factors with no more than one error	Condone the inclusion of 1 for the method marks
		M1	for complete factorisation, eg 2, 2, 5, 5, 5	Could be shown on a fully correct factor tree
		A1	for $2^2 \times 5^3$	
2 (a)	$3\frac{17}{20}$	M1	for finding two fractions with a correct common denominator (multiple of 20), with at least one correct corresponding numerator, eg $\frac{12}{20}, \frac{5}{20}$ or $\frac{32}{20}, \frac{45}{20}$	May be from $\frac{3}{5}$ and $\frac{1}{4}$ or from $\frac{8}{5}$ and $\frac{9}{4}$
		A1	for $3\frac{17}{20}$ or an equivalent mixed number SC B1 for an answer of 3.85 if M0 scored	
(b)	shown	M1	for $\frac{8}{3} \times \frac{1}{6}$ oe or $\frac{4}{9} \times \frac{6}{1}$ oe or $\frac{8}{3} \times \frac{9}{4}$ oe	
		A1	for unsimplified fraction which could lead to $\frac{4}{9}$, eg $\frac{8}{18}$ or for $\frac{4}{3} \times \frac{1}{3}$ or $\frac{24}{9} \div 6$ or for unsimplified fraction which could lead to $2\frac{2}{3}$, eg $\frac{24}{9}$ or for unsimplified fraction which could lead to 6, eg $\frac{72}{12}$	

Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
3	2^6	M1 A1	for the start of a method of simplification, eg 2^{-5+8} ($= 2^3$) or $2^{-5 \times 2}$ ($= 2^{-10}$) or $2^{8 \times 2}$ ($= 2^{16}$) cao SC B1 for answer of 64 or 8^2 or 4^3 if M0 scored.	
4	0.00128	M1 A1	for digits 128 or for correct placement of the decimal point following one arithmetical error, eg $32 \times 4 = 138$ with an answer of 0.00138 for 0.00128 or 1.28×10^{-3}	
5	7500	M1 A1	for method to find expected number of model B, eg $\frac{15}{80} \times 40000$ oe or $\frac{15}{"23+15+30+12"} \times 40000$ oe cao	

Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
6 (a)(i)	2 : 6 : 5	P1	for process to compare ratios, eg $a : b = 2 : 6$ or $b : c = 3 : 2.5$	Could use 3 or any common multiple of 3 and 6
		A1	for 2 : 6 : 5 oe	
		M1	for process to find fraction, eg $\frac{[2]}{[2+6+5]}$ or for $\frac{a}{a+b+c}$	
(ii)	$\frac{2}{13}$	A1	for $\frac{2}{13}$ oe or ft (a)(i)	
(b)	1 : 10	P1	for process to express all numbers in terms of one number, eg $p = 5 \times 2m (= 10m)$ or $m = \frac{n}{2}$ or for $2m = \frac{p}{5}$ or for assigning values in the ratio given, eg $m = 1, n = 2, p = 10$ or for $n : m : p = 2 : 1 : 10$ oe or 10 : 1 oe	
		A1	for 1 : 10 oe	

Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
7	1250	P1 A1	for process to use area of base in the formula, eg $\frac{10000}{2 \times 4}$ cao	
8	Pair of values	P1 A1	for at least 5 multiples of 5 (with no more than 1 incorrect) or for at least 5 multiples of 7 (with no more than 1 incorrect) or for $m =$ a multiple of 35 and $n =$ a multiple of 14 or for $m = 35$ or $n = 14$ for a correct pair of values, eg $m = 35$ and $n = 14$ or $m = 35$ and $n = 28$ or $m = 105$ and $n = 14$	$m = 35, n = 14, 28, 42, 56, 84, \dots$ $m = 105, n = 14, 28, 56, 98, \dots$
9	(a) (9), -4, -5, 0, 5, (4), (-9) (b) Graph drawn	B2 (B1) B2 (B1)	for all 4 values correct for 2 or 3 correct values) for a fully correct graph ft (dep on B1 in (a)) for plotting at least 5 of the points from their table correctly)	Accept a freehand curve drawn that is not made of line segments Ignore anything outside the required range

Paper: IMA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
10 (a)	$\frac{1}{16}$	M1	for method to find probability of getting a score of 5, eg $\frac{10}{6+8+9+7+10} (= \frac{10}{40})$ oe	Accept any equivalent fraction, decimal form 0.06(25) or 0.063, percentage form 6(.25)% or 6.3% Ignore subsequent incorrect attempts to write the correct answer in a different form.
(b)	15	M1	for method to find the proportion of 1s, eg $\frac{6}{40}$ oe	
		A1	for $\frac{1}{16}$ oe	
		A1	cao	
11	Enlargement scale factor $\frac{1}{3}$ centre (0, 2)	B2	for enlargement scale factor $\frac{1}{3}$ centre (0, 2)	No marks if more than one transformation is given
		(B1)	for any 2 aspects)	
12	$x = 3, y = -2$	M1	for a correct method to eliminate either variable or rearrangement of one equation leading to substitution (condone one arithmetic error)	Trial and improvement methods score 0 marks unless both x and y are correct
		A1	for either correct value of x or correct value of y	
		M1	(dep M1) for a correct substitution of found value into one of the equations or a correct method leading to the second value (condone one arithmetic error)	
		A1	$x = 3, y = -2$	

Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
13	$t = 20$ $p = 4, 50$	M1 M1 A1	for method to find a missing value of p , eg $\frac{100}{25}$ oe (= 4) or $\frac{100}{2}$ oe (= 50) or for $p = \frac{100}{t}$ for method to find the missing value of t , eg $100 \div \frac{5}{1}$ (= 20) or for finding both missing values of p cao	Marks for 4 or 50 can only be awarded if in correct cell of table or unambiguous in working Mark for 20 can only be awarded if in correct cell of table or unambiguous in working
14	Histogram drawn	B3 (B2) (B1)	for fully correct histogram, eg relative heights 1, 5, 6, 1.5 for 3 correct bars or for frequency \div class interval for at least 3 frequencies and 2 correct bars of different widths) for 2 correct bars of different widths or for frequency \div class interval for at least 3 frequencies)	Frequency densities are 1, 5, 6, 1.5
15	40	P1 P1 A1	for a start to the process, eg $\frac{x}{360} \times 2 \times \pi \times 18$ (= 4π) oe or $\frac{4\pi}{2 \times \pi \times 18}$ (= $\frac{x}{360}$) oe for a complete process to find x , eg $\frac{4\pi}{36\pi} \times 360$ oe cao	Any arrangement equivalent to this equation acceptable

Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
16 (a)	Proof	M1	<p>for expansion of $(2m + 1)^2$ or $(2n - 1)^2$, all 4 terms correct with or without signs (and no additional terms) or 3 out of 4 terms correct with signs, eg $4m^2 + 2m + 2m + 1$ or $4n^2 - 2n - 2n + 1$</p> <p>or for correct expansion of $4(m + n)(m - n + 1)$ or $(m + n)(m - n + 1)$ eg $4m^2 - 4mn + 4m + 4mn - 4n^2 + 4n$ oe or $m^2 - mn + m + mn - n^2 + n$ oe</p> <p>or for $[2m + 1 + 2n - 1][(2m + 1) - (2n - 1)]$</p>	<p>Note that, for example, $4m + 1$ is regarded as 3 terms in the expansion of $(2m + 1)^2$</p> <p>Must see correct expression</p> $4m^2 - 4n^2 + 4m + 4n$ $= 4[(m^2 - n^2) + (m + n)]$ $= 4[(m + n)(m - n) + (m + n)]$ $= 4(m + n)(m - n + 1)$
		M1	<p>for correct expression after expansion for $(2m + 1)^2 - (2n - 1)^2$ eg $(4m^2 + 4m + 1) - (4n^2 - 4n + 1)$ or $4m^2 + 4m + 1 - 4n^2 + 4n - 1$ oe (= $4m^2 + 4m - 4n^2 + 4n$)</p> <p>or for $[2m + 1 + 2n - 1][2m + 1 - 2n + 1]$</p>	
		C1	<p>for a complete proof without any errors, eg uses difference of two squares to show that LHS = RHS</p> <p>or expands both sides and shows that LHS = RHS</p> <p>or expands and simplifies LHS and factorises convincingly to get RHS</p>	
(b)	Yes (supported)	C1	<p>for yes with explanation, eg $2m + 1$ and $2n - 1$ are odd numbers (for any positive integer value of m, n) and the right-hand side is a multiple of 4</p>	

Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
17	$\frac{16}{81}$	M1	for showing the cube root of 8 = 2 and the cube root of 27 = 3 or an intention to find the cube root and raise to power 4 eg $\sqrt[3]{\left(\frac{8}{27}\right)^4}$ or $\left(\sqrt[3]{\frac{8}{27}}\right)^4$ or $\left(\frac{2}{3}\right)^4$	
		A1	cao	

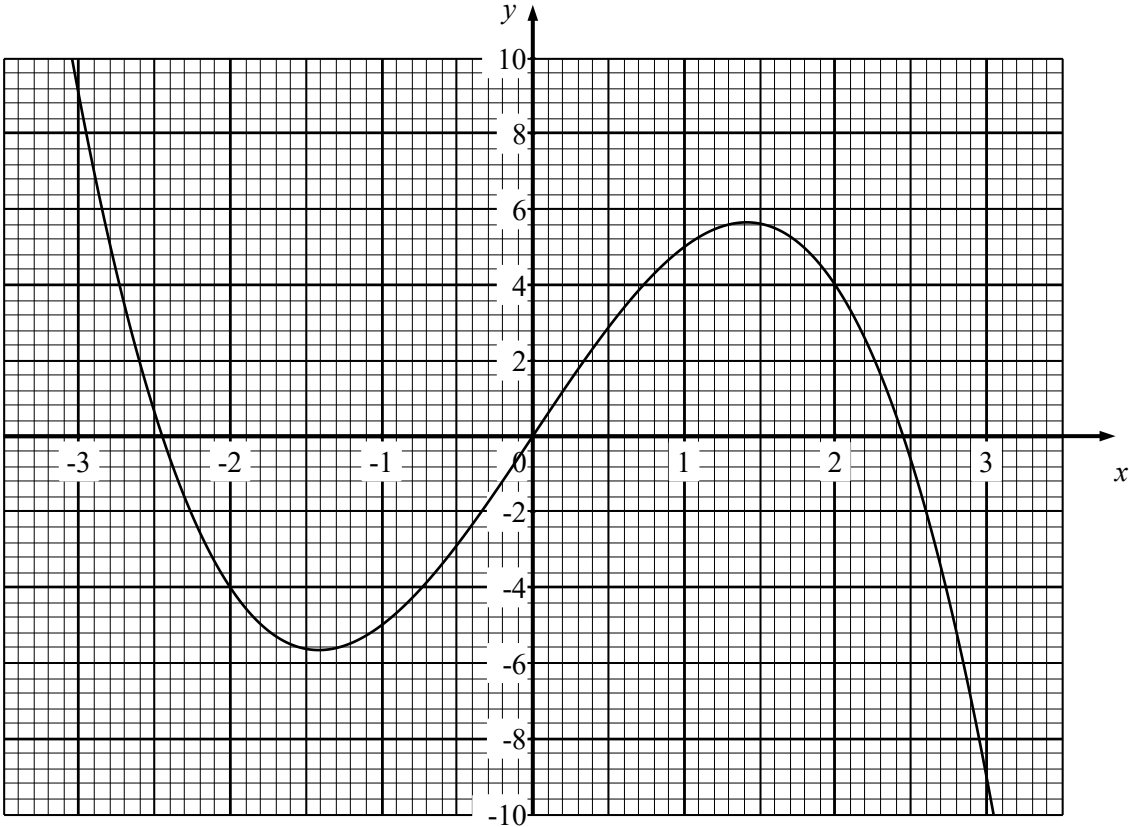
Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
19	$-\frac{1}{2} \pm \frac{1}{2}\sqrt{2}$	P1	for using a common denominator, eg $\frac{x+1}{x(x+1)} - \frac{x}{x(x+1)}$ (= 4) or $\frac{x+1-x}{x(x+1)}$ (= 4) or $x+1-x=4x(x+1)$	Note we don't need to see "= 0"; just the LHS is sufficient Accept other forms of the 3 term quadratic, eg $4x^2 + 4x = 1$ Correct use of formula or completing the square
		P1	for expanding and rearranging to get $4x^2 + 4x - 1 (= 0)$	
		P1	(dep P1) ft for a method to solve their 3 term quadratic equation, eg $\frac{-4 \pm \sqrt{4^2 - 4 \times 4 \times -1}}{2 \times 4}$ or $4 \left[\left(x + \frac{1}{2} \right)^2 - \left(\frac{1}{2} \right)^2 \right] - 1 = 0$ oe	
		A1	for values of x, eg $\frac{-4 \pm \sqrt{32}}{8}$ or $\pm \sqrt{\frac{1}{2}} - \frac{1}{2}$ oe	
		A1	for $-\frac{1}{2} \pm \frac{1}{2}\sqrt{2}$ oe in the form $a \pm b\sqrt{2}$ where a and b are fractions	
				Accept $a = -\frac{1}{2}, b = \frac{1}{2}$ or $a = -\frac{1}{2}, b = -\frac{1}{2}$

Paper: 1MA1/1H					
Question	Answer	Mark	Mark scheme	Additional guidance	
20	$\frac{62}{110}$	P1	for process to find a probability of 2 cards of different colours, eg $\frac{3}{11} \times \frac{7}{10}$ or $\frac{3}{11} \times \frac{1}{10}$ or $\frac{7}{11} \times \frac{3}{10}$ or $\frac{7}{11} \times \frac{1}{10}$ or $\frac{1}{11} \times \frac{3}{10}$ or $\frac{1}{11} \times \frac{7}{10}$ oe or $\frac{3}{11} \times \frac{8}{10}$ oe or $\frac{7}{11} \times \frac{4}{10}$ oe or $\frac{1}{11} \times \frac{10}{10}$ oe	May see fraction with denominator 110	
		P1	for a complete process, eg $\frac{3}{11} \times \frac{7}{10} + \frac{3}{11} \times \frac{1}{10} + \frac{7}{11} \times \frac{3}{10} + \frac{7}{11} \times \frac{1}{10} + \frac{1}{11} \times \frac{3}{10} + \frac{1}{11} \times \frac{7}{10}$ oe or $\frac{3}{11} \times \frac{8}{10} + \frac{7}{11} \times \frac{4}{10} + \frac{1}{11} \times \frac{10}{10}$ oe		
		A1	for $\frac{62}{110}$ oe		Accept equivalent fraction, decimal form 0.56(36...) or percentage form 56(.36...)%
		P1	OR for process to find a probability of 2 cards of the same colour, eg $\frac{3}{11} \times \frac{2}{10}$ or $\frac{7}{11} \times \frac{6}{10}$ or $\frac{1}{11} \times \frac{0}{10}$ oe		
		P1	for a complete process, eg $1 - \frac{3}{11} \times \frac{2}{10} - \frac{7}{11} \times \frac{6}{10}$ ($-\frac{1}{11} \times \frac{0}{10}$) oe		
		A1	for $\frac{62}{110}$ oe		
			SC B1 for answer of $\frac{62}{121}$ (replacement)		

Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
21	(180, -1)	B1 B1	for 180 ^(o) for -1 SC B1 if B0 scored for answer of (-1, 180)	
22	$\frac{65}{214}$	B1 P1 P1 A1	for $\sin 30 = 0.5$ for use of the sine rule with values substituted, eg $\frac{6.5}{\sin ABC} = \frac{10.7}{\sin 30}$ oe for $(\sin ABC =) \frac{6.5 \times \sin 30}{10.7}$ oe or for a complete process to find $\sin ABC$, eg $(\sin ABC =) \frac{6.5 \times [0.5]}{10.7}$ oe for $\frac{65}{214}$ oe eg $\frac{325}{1070}$	Answer of $\frac{3.25}{10.7}$ or $\frac{6.5}{21.4}$ gets 3 marks Where [0.5] is their value of $\sin 30$ Answer must be in the form $\frac{m}{n}$ where m and n are integers

Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
23 (a)	4000	P1	for process to identify the common ratio, eg $400\sqrt{5} \div 200 (= 2\sqrt{5})$ or $200 \div 400\sqrt{5} (= \frac{1}{2\sqrt{5}})$	May use any 2 consecutive terms
			or for a process to find the next term of the sequence, eg $200 \times (200 \div 10)$	
		A1	cao	
(b)	5	P1	for process to find the ratio of the 4th and 6th terms, eg $\frac{5\sqrt{2}}{8} \div \frac{5\sqrt{2}}{4} (= \frac{1}{2})$ or $\frac{5\sqrt{2}}{4} \div \frac{5\sqrt{2}}{8} (= 2)$	Award 0 marks for a correct answer with no supportive working
			or for finding that the 2nd term is $\frac{5\sqrt{2}}{2}$	
		P1	for complete process to find 1st term, eg $\frac{5\sqrt{2}}{4} \div \left(\frac{1}{\sqrt{2}}\right)^3$	
		A1	cao	
24 (a)	1 : 4	P1	for process to equate the two volumes, $\frac{4}{3}\pi r^3 = \frac{1}{3}\pi r^2 h$	Can be implied by $3r = l$
		A1	cao	
(b)	$1 : \sqrt{8}$	P1	for process to equate surface areas, eg $4\pi r^2 = \pi r^2 + \pi r l$	Can be implied by $3r = l$
		P1	for process to substitute $l = \sqrt{h^2 + r^2}$, eg $4\pi r^2 = \pi r^2 + \pi r \sqrt{h^2 + r^2}$	
		P1	for process to isolate term in r^2 after substituting for l , eg $8r^2 = h^2$	
		A1	for $1 : \sqrt{8}$	

Question 9(b)



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

Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme. Notes apply to both MLP papers and Braille papers unless otherwise stated.

The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:

Angles: $\pm 5^\circ$

Measurements of length: ± 5 mm

PAPER: 1MA1_1H		
Question	Modification	Mark scheme notes
5	Wording added 'Look at the table for Question 5 in the Diagram Booklet.' Wording added 'in the Diagram Booklet'. Table enlarged.	Standard mark scheme
6	(a) Text left aligned. Values changed: a to p ; b to q ; c to r	Standard mark scheme but note change of letter
6	(b) Text left aligned. Values changed: m to w ; n to x ; p to y	Standard mark scheme but note change of letter
7	Wording added 'Look at Diagram 1 and Diagram 2 for Question 7 in the Diagram Booklet. You may be provided with a model. It is not accurate.' Wording added 'Diagram 1 and the model show'. Wording added 'that'. Diagram enlarged. Base view added with measurements. Wording added 'Diagram 2 shows the base view.' Frame removed from formula and moved above the diagram to the left	Standard mark scheme
9	(a) Wording added 'below'. Wording added 'There are four spaces to fill.' Table turned vertical and enlarged.	Standard mark scheme
9	(b) Wording added 'Look at the diagram for Question 9(b) in the Diagram Booklet.' Wording added 'in the Diagram Booklet'. Diagram enlarged. Axes labels moved above the vertical axis and right on the horizontal axis. Open headed arrows. Black grid lines. Small squares removed.	Standard mark scheme
10	Wording added 'Look at the diagram and table for Question 10 in the Diagram Booklet.' The word 'a' removed and replaced with 'the'. Wording added 'in the Diagram Booklet'. Diagram enlarged. Spinner straightened and spike removed. Dot added to the centre. Table turned vertical and enlarged. The wording 'Here are her results' removed and replaced with 'Her results are shown in the table in the Diagram Booklet.'	Standard mark scheme
11	Wording added 'Look at the diagram for Question 11 in the Diagram Booklet. It shows Shape P and Shape Q.' Labels moved above the shapes. Shapes relabelled as 'Shape P' and 'Shape Q'. Wording added 'in the Diagram Booklet'. Diagram enlarged. Shading changed. Axes labels moved above the vertical axis and right on the horizontal axis. Open headed arrows. Black grid lines.	Standard mark scheme
13	Wording added 'Look at the table for Question 13 in the Diagram Booklet.' Wording added 'There are three spaces to fill.' Table turned vertical and enlarged.	Standard mark scheme

PAPER: 1MA1_1H

Question	Modification	Mark scheme notes
14	Wording added 'Look at the diagram for Question 14 in the Diagram Booklet. It shows a grid.' Wording added 'in the Diagram Booklet'. Diagram enlarged. Axes labels moved above the vertical axis and left on the horizontal axis.	Standard mark scheme
15	Wording added 'Look at the diagram for Question 15 in the Diagram Booklet.' Diagram enlarged. Angle moved outside the angle arc. Angle arc made smaller.	Standard mark scheme
18	Wording added 'Look at the diagram for Question 18 in the Diagram Booklet. It shows a circle with centre O' Diagram enlarged. Angle moved outside the angle arc. Angle arc made smaller. The wording 'a circle, centre O.' removed and replaced with 'the circle.' Wording added 'The lines AB, OB and OA form the triangle AOB.' The word 'point' added. Dot at O enlarged.	Standard mark scheme
21	Wording added 'Look at the diagram for Question 21 in the Diagram Booklet. It shows' The wording 'The diagram' removed. Diagram enlarged. Axes labels moved above the vertical axis and right on the horizontal axis. Open headed arrows. Change cross to solid dot.	Standard mark scheme
22	Wording added 'Look at the diagram for Question 22 in the Diagram Booklet.' The wording 'Here is' removed and replaced with 'It shows'. Diagram enlarged. Angle moved outside the angle arc. Angle arc made smaller. Wording added: 'AC = 6.5cm'; 'BC = 10.7 cm'; 'Angle BAC = 30°'	Standard mark scheme

PAPER: IMA1_1H

Question		Modification	Mark scheme notes
24	(a)	<p>Wording added ‘Look at Diagram 1, Diagram 2, Diagram 3, Diagram 4 and Diagram 5 for Question 24(a) in the Diagram Booklet. You may be provided with models. They are not accurate.’</p> <p>Diagrams enlarged and added for 2D representation of sphere, cone side and cone base. The wording ‘Here is a solid sphere and a solid cone’ removed and replaced with ‘Diagram 1 and model 1 show a solid sphere. Diagram 2 shows a 2D representation of the sphere. Diagram 3 and Model 2 show a solid cone. Diagram 4 shows a 2D representation of the cone. Diagram 5 shows the base of the cone.’</p> <p>Wording added ‘radius of the sphere = radius of the base of the cone = r’.</p> <p>Wording added ‘vertical height of the cone = h’; Wording added ‘Volume of sphere = $\frac{4}{3}\pi r^3$’</p> <p>Wording added ‘Volume of cone = $\frac{1}{3}\pi r^2 h$’</p> <p>Dashed lines made longer and thicker. Diagram headings moved above the diagrams. Labels moved to the left side. Models provided.</p>	Standard mark scheme
24	(b)	<p>Wording added ‘Look at Diagram 1, Diagram 2, Diagram 3, Diagram 4 and Diagram 5 for Question 24(b) in the Diagram Booklet. You may be provided with models. They are not accurate. They show a different solid sphere and solid cone.’</p> <p>The wording ‘Here is a different solid sphere and a different solid cone.’ Removed.</p> <p>Diagrams enlarged and added for 2D representation of sphere, cone side view and cone base’</p> <p>Wording added ‘Diagram 1 and model 1 show a solid sphere. Diagram 2 shows a 2D representation of the sphere. Diagram 3 and Model 2 show a solid cone. Diagram 4 shows a 2D representation of the cone. Diagram 5 shows the base of the cone.’</p> <p>Wording added ‘radius of the sphere = radius of the base of the cone = r’.</p> <p>Wording added ‘slant height of the cone = l’; ‘Surface area of sphere = $4\pi r^2$’</p> <p>Wording added ‘Curved area of cone = $\pi r l$’</p> <p>Dashed lines made longer and thicker. Diagram headings moved above the diagrams. Labels moved to the left side. Models provided.</p>	Standard mark scheme

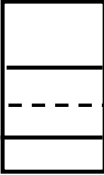


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Mark Scheme (Results)

November 2022

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

Paper: 1MA1/2H					
Question	Answer	Mark	Mark scheme	Additional guidance	
1	(a)	(2, 1)	B1	cao	Accept negative correlation Ignore any comment about strength Any numbers used in the description must be within tolerance
	(b)	Description	C1	correct description, eg as the amount of rainfall decreases the number of hours of sunshine increases	
	(c)	3 to 4	M1	for a suitable line of best fit drawn, or for a point marked at $(x, 7)$, or a horizontal line drawn from 7 across to $(x, 7)$ where x is in the range 2.5 to 4	
			A1	answer in the range 3 to 4	
2		Elevation	B2	fully correct side elevation 5 high and 3 wide	
			(B1	for a rectangle 5 high and 3 wide or correct side elevation in the wrong orientation)	
3	(a)	$6n + 1$	B2	oe	2, -4, -10, -16, -22, -28, -34, -40, -46, -52 May stop at -58 or ring if sequence continues
			(B1	for $6n + c$ where c is an integer $\neq 1$ or is missing)	
	(b)	Shown with supportive working	M1	for $8 - 6n = -58$ or $8 - 6 \times 11 (= -58)$ or starts to list terms of the sequence, with at least 3 correct or any other valid method.	
			A1	shown with working or an explanation , eg Yes and 11 or 2, -4, -10, -16,, -52, -58	

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
4	186.15	P1	for correctly finding the area of at least three sections, eg 3 of $11 \times 7 (= 77)$, or $9 \times 7 (= 63)$, or $\frac{1}{2} \times 11 \times 9 (= 49.5)$, or $\frac{1}{4} \times \pi \times 7^2 (= 38.4845..)$	Note a trapezium for the rectangle and triangle should be classed as two areas. Accept figures rounded or truncated to 1 dp or better throughout. This mark is dependent upon correct processes seen for all four sections. integer number of bags must come from area \div 14 rounded up
		P1	for a method to find the number of bags required for one area or a combination of areas eg “77” \div 14 (= 5.5) or “227.9845..” \div 14 (= 16.2846...)	
		P1	for method to work out the total area for all four sections eg “77” + “63” + “49.5” + “38.4845...” (= 227.9845...) or adding the exact number of bags per section for all four sections eg “5.5” + “4.5” + “3.53..” + “2.74..” (= 16.28...)	
		P1	for method to find the cost, eg integer number of bags \times 10.95	
		A1	cao	
5	8.73	M1	for a correct trig statement, eg $14.5 \times \cos 53$ or $\cos 53 = x \div 14.5$	Can use a combination of skills but must have only one unknown in x to score this mark If an answer is given in the range in working and then rounded incorrectly award full marks.
		A1	answer in the range 8.726 to 8.73	
6	7318.15	M1	for a correct first step eg working out increase for one year $7000 \times (100 + 3) \div 100 (= 7210)$ oe or $7000 \times 3 \div 100 (= 210)$ oe or find the multiplier for both years eg $(100 + 3) \div 100 \times (100 + 1.5) \div 100 (= 1.04545)$	7315 or 315 implies M1 318.15 implies M1M1A0
		M1	for a compound method, eg $7000 \times (100 + 3) \div 100 \times (100 + 1.5) \div 100$ oe or “7210” \times 1.5 \div 100 or (= 108.15) oe	
		A1	cao	

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
7 (a)	4	B1	for 4	Condone (0,4) or 0,4 Accept both solutions given as a coordinate for M1 eg (5.2, 0.8) or (0.8, 5.2) or (5.2, 0) and (0.8, 0)
(b)	(3, -5)	B1	cao	
(c)	5.1 to 5.3 and 0.7 to 0.9	M1 A1	for a correct method, eg marking both intercepts with x -axis or one correct solution for answers in the range 5.1 to 5.3 and 0.7 to 0.9	
8	12.5	M1 M1 A1	for $135 - 120 (= 15)$ or $\frac{135}{120} (= 1.125)$ or $\frac{135}{120} \times 100 (= 112.5)$ for “15” $\div 120 \times 100$ or “112.5” $- 100$ or (“1.125” $- 1) \times 100$ cao	
9	Yes with comparisons shown	M1 A1	for starting to manipulate equation eg $y = \frac{3}{6}x + \frac{7}{6}$ or $y = \frac{1}{2}x + \frac{7}{6}$ or $3y = \frac{3}{2}x - 6 \times 3$ or $6y = 3x - 36$ for statement and equation(s) which can be used to show that the gradients of the two lines are the same eg $y = \frac{1}{2}x + \frac{7}{6}$ and both have a gradient of $\frac{1}{2}$ or Yes, $6y = 3x - 36$ and both have the same x coefficients	Ignore constant terms for both marks

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
10	17500	P1 P1 A1	for a process to find the value at the end of year 1, eg $10914.75 \div 0.81 (= 13475)$ or $10914.75 \div 0.77 (= 14175)$ or for finding the combined multiplier, eg $0.77 \times 0.81 (= 0.6237)$ for a complete process to find the initial value, eg “ $13475 \div 0.77$ ” or “ $14175 \div 0.81$ ” or $10914.75 \div “0.6237”$ cao	
11	Box plot	B3 (B2 (B1	for fully correct box plot for box plot showing a box and at least 3 correctly plotted values from 24, 42, 54, 64, 96) for correctly identifying one of the LQ (42) Median (54) or UQ (64) from the CF graph)	Box can be of any height. Accept ends that are marked (eg line, cross, dot) or defined by the end of the whiskers if clear May be implied by one of these correct on the box plot
12 (a)	6	M1 A1	for an attempt to evaluate 1.13^n for at least one value of n (with $n > 1$) 6 years coming from finding n such that $1.13^n > 2$	1.13, 1.27..., 1.44..., 1.63..., 1.84..., 2.08... May be used with a value Values rounded or truncated to 2dp or better
(b)	Explanation	C1	for explanation Acceptable examples it will decrease the number of years will go down we can't tell (as we don't know how much it is increasing by) it will be an overestimate Not acceptable examples it will increase it will be an underestimate	

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
13	18.6	M1 A1	for use of Pythagoras eg, $(-5 - 6)^2 + (8 - -7)^2$ or $121 + 225$ or 346 or $\sqrt{346}$ answer in the range 18.6 to 18.61	If a correct answer within the range is shown in working but incorrectly rounded award full marks
14	Shown	M1 M1 A1	for $(x =) 1.0622\dots$ or $(10x =) 10.622\dots$ or $(100x =) 106.22\dots$ or $(1000x =) 1062.2\dots$ OR for $(x =) 0.0622\dots$ or $(10x =) 0.622\dots$ or $(100x =) 6.22\dots$ or $(1000x =) 62.2\dots$ (dep M1) for a method using two recurring decimals that leads to a terminating decimal difference, using correct multiples of x eg $(1000x - 100x =) 1062.2\dots - 106.22\dots (= 956)$ or $\frac{956}{900}$ OR (dep M1) for a method using two recurring decimals that leads to a terminating decimal difference, using correct multiples of x eg $(1000x - 100x =) 62.2\dots - 6.22\dots (= 56)$ or $\frac{56}{900}$ for completing algebra to $1\frac{14}{225}$	Use of recurring notation acceptable throughout.

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
15 (a)	70	P1	for $\frac{20}{12}$ (= 1.66..) or $\frac{12}{20}$ (= 0.6) or $\frac{12}{42}$ (= 0.2857..) or $\frac{42}{12}$ (= 3.5)	Decimal values truncated or rounded to 2 dp or more
		P1	for $\frac{20}{n} = \frac{12}{42}$ or $\frac{12}{20} = \frac{42}{n}$ or $\frac{20 \times 42}{12}$	
		A1	cao	
(b)	Explanation	C1	for explanation Acceptable examples the sample size cannot be greater than the population the population is greater than the sample size there are more than 50 rabbits he catches 55 rabbits Not acceptable examples the sample size is too small some of the tags could fall off he has underestimated	
16	$y \geq 3x + 6$	M1	for $y = 6$ indicated or $x = -3$ indicated	Accept any inequality in place of “=” for all method marks Equations/inequalities may be seen on the diagram
	$x \geq -3$	M1	for $y = 3x + 6$ oe indicated	
	$y \geq \frac{x}{2} + 1$	M1	for $y = \frac{x}{2} + 1$ oe indicated	
	$y \leq 6$	A1	for $y \geq 3x + 6$ oe, $x \geq -3$, $y \geq \frac{x}{2} + 1$ oe and $y \leq 6$	

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
17	3.6	P1 P1 P1 A1	<p>process to find the volume scale factor, eg $1587.762 \div 58.806 (= 27)$ or $58.806 \div 1587.762 (= 0.037\dots)$</p> <p>process to find the height of B, eg $2 \times 43.74 \div 8.1 (= 10.8)$ or process to find the area of A, eg $43.74 \div (\sqrt[3]{27})^2 (= 4.86)$ or $43.74 \times (\sqrt[3]{0.037\dots})^2 (= 4.86)$</p> <p>complete process to find height of A, eg “10.8” $\div \sqrt[3]{27}$ or “4.86” $\times 2 \div (8.1 \div \sqrt[3]{27})$</p> <p>cao</p>	
18	21.3	P1 A1	<p>for $\frac{1}{2} \times 11.2 \times 4.3 \times \sin(118)$</p> <p>answer in the range 21.26 to 21.3</p>	If a correct answer within the range is shown in working but incorrectly rounded award full marks
19	$-\frac{3}{2}$ and $\frac{2}{3}$	M1 M1 A1	<p>for $(2x \pm 3)(3x \pm 2)$ or $(6x \pm 4)(x \pm \frac{9}{6})$ or $(6x \pm 4)(x \pm \frac{3}{2})$ or correct substitution into the quadratic formula, eg $\frac{-5 \pm \sqrt{5^2 - 4 \times 6 \times (-6)}}{2 \times 6}$</p> <p>$(2x + 3)(3x - 2)$ $(6x - 4)(x + \frac{9}{6})$ or $(6x - 4)(x + \frac{3}{2})$ or $\frac{-5 \pm \sqrt{169}}{12}$ or one correct answer</p> <p>oe accept answers of -1.5 and in the range 0.66 to 0.67</p>	

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
20	56	P1	for a correct process to find AF , eg $\sqrt{13^2 - 9^2}$ (= 9.38...) or $2\sqrt{22}$ or $\sqrt{88}$	Decimal values truncated or rounded to 3 sf or more If a correct answer within the range is shown in working but incorrectly rounded award full marks
		P1	for a correct process to find FH , eg $\frac{9}{\cos(49)}$ (= 13.7...)	
		P1	for a correct trig statement involving FAH , eg $\tan(FAH) = \frac{"13.7..."}{"9.38..."}$	
		A1	answer in the range 55.6 to 56	
21 (a)	1.06	M1	for tangent drawn at $t=17.5$	No tangent drawn at $t=17.5$ scores zero marks Use of change in y over change in x Working may be seen on the diagram Answer of $\frac{10.5}{17.5}$ oe scores no marks Accept answers in the form a/b where a and b are integers
		M1	for a complete method to find the gradient, eg tangent drawn at $t = 17.5$, and $18.5 \div 17.5$	
		A1	answer in the range 0.9 to 1.2	
(b)	Explanation	C1	suitable explanation, eg the rate of change of volume	If units are given they must be correct.
22	$\frac{x^3 - 3}{2}$	M1	for $(h(x)) = \sqrt[3]{2x + 3}$	[$h(x)$] must be their composite function and cannot be either $\sqrt[3]{x}$ or $2x + 3$
		M1	for a correct first step to find the inverse of [$h(x)$]	
		A1	oe	

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
23	20	B1	stating bound, eg 10.65 or 10.55 or 31 min 48.5sec or 31 min 47.5sec or 1908.5sec or 1907.5sec	
		P1	(dep on B1) for a correct bound for time in hours, eg 0.5301(38...) or 0.5298(61...) Or a correct process to find one bound for speed in km per minute eg $[\text{UB of S}] = [\text{UB of D}] \div [\text{LB of T}]$ or $[\text{LB of S}] = [\text{LB of D}] \div [\text{UB of T}]$ or a correct process to find one bound for speed in km per second eg $[\text{UB of S}] = [\text{UB of D}] \div [\text{LB of T}]$ or $[\text{LB of S}] = [\text{LB of D}] \div [\text{UB of T}]$	Bound rounded or truncated to 4 dp Where $10.6 < [\text{UB of D}] \leq 10.65$ and $31 \text{ min } 47.5 \text{ sec} \leq [\text{LB of T}] < 31 \text{ min } 48 \text{ sec}$ Or $10.55 \leq [\text{LB of D}] < 10.6$ and $31 \text{ min } 48 \text{ sec} < [\text{UB of T}] \leq 31 \text{ min } 48.5 \text{ sec}$ Where $10.6 < [\text{UB of D}] \leq 10.65$ and $1907.5 \text{ sec} \leq [\text{LB of T}] < 1908 \text{ sec}$ Or $10.55 \leq [\text{LB of D}] < 10.6$ and $1908 \text{ sec} < [\text{UB of T}] \leq 1908.5 \text{ sec}$
		P1	(dep on P1) for correct process to find one bound for speed in km per hour, eg $[\text{UB of S}] = [\text{UB of D}] \div 0.5298(61...)$ or $[\text{LB of S}] = [\text{LB of D}] \div 0.5301(38...)$ OR Correct process to convert a bound for speed in km per minute to km per hour eg $[\text{UB of S}] = [\text{UB of D}] \div [\text{LB of T}] \times 60$ or $[\text{LB of S}] = [\text{LB of D}] \div [\text{UB of T}] \times 60$ OR Correct process to convert a bound for speed in km per second to km per hour eg $[\text{UB of S}] = [\text{UB of D}] \div [\text{LB of T}] \times 60 \times 60$ or $[\text{LB of S}] = [\text{LB of D}] \div [\text{UB of T}] \times 60 \times 60$	Time used in hours Where $10.6 < [\text{UB of D}] \leq 10.65$ and $31 \text{ min } 47.5 \text{ sec} \leq [\text{LB of T}] < 31 \text{ min } 48 \text{ sec}$ Or $10.55 \leq [\text{LB of D}] < 10.6$ and $31 \text{ min } 48 \text{ sec} < [\text{UB of T}] \leq 31 \text{ min } 48.5 \text{ sec}$ Where $10.6 < [\text{UB of D}] \leq 10.65$ and $1907.5 \text{ sec} \leq [\text{LB of T}] < 1908 \text{ sec}$ Or $10.55 \leq [\text{LB of D}] < 10.6$ and $1908 \text{ sec} < [\text{UB of T}] \leq 1908.5 \text{ sec}$
		A1	for both correct bounds from correct working, 20.099... and 19.900...	Figures rounded or truncated to 3 sf or better
		C1	for 20 correct to 2 significant figures as both bounds agree.	

Paper: 1MA1/2H

Question	Answer	Mark	Mark scheme	Additional guidance
24	$6x + 8y = 35$	M1 M1 M1 A1	for a process to find the gradient of the radius, eg $\frac{2.8-0}{2.1-0}$ ($= \frac{4}{3}$) for process to find the gradient of the tangent, eg uses $\frac{-1}{"m"}$ for substitution of (2.1, 2.8) into $y = \frac{-3}{4}x + c$ or into $(y - y_1) = \frac{-3}{4}(x - x_1)$ oe as long as in the form $ax + by = c$, where a , b and c are integers	

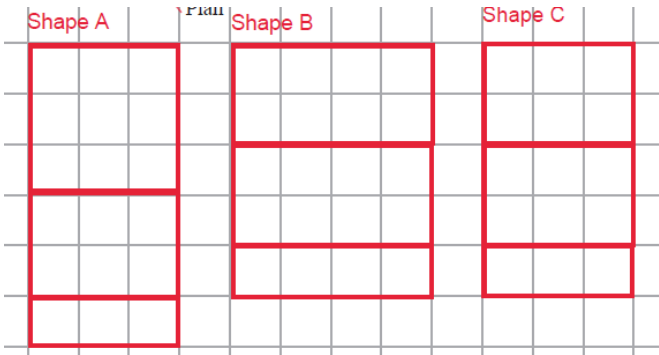
Modifications to the mark scheme for Modified Large Print (MLP) papers: 1MA1 2H

Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme. Notes apply to both MLP papers and Braille papers unless otherwise stated.

The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:

Angles: $\pm 5^\circ$

Measurements of length: ± 5 mm

PAPER: 1MA1_2H		
Question	Modification	Mark scheme notes
1	<p>Wording added ‘Look at the diagram for Question 1 in the Diagram Booklet.’</p> <p>Diagram enlarged and intermediates marked. Crosses changed to dots.</p> <p>Axes labels moved above the vertical axis and left on the horizontal axis.</p> <p>Open headed arrows. Small squares removed.</p>	Standard mark scheme but in part (c) widen the range to consider 2.5 to 4.5
2	<p>Wording added ‘Look at the diagram for Question 19 in the Diagram Booklet. It shows a grid with shapes.’</p> <p>The wording ‘and the plan of a solid are shown on the grid’ removed and replaced with ‘of a solid is shown in the Diagram Booklet.’</p> <p>The wording ‘On the grid, draw the’ removed and replaced with ‘Choose which of the shapes A to C shows the side elevation of the solid from the direction of the arrow.’</p> <p>‘Front elevation’ and ‘Plan’ labels moved above.</p> <p>Shapes labelled ‘Shape A’ to ‘Shape C’. Grid and diagrams enlarged. Shape outlines made thicker.</p> <p>Open headed arrow. Arrow made thicker. Model provided.</p> 	<p>Shape C is the correct shape for 2 marks.</p> <p>The dotted line was removed to avoid confusion to visually impaired candidates.</p>
3	The wording ‘Here’ removed and replaced with ‘Below’. Terms left aligned	Standard mark scheme
4	<p>Wording added ‘Look at the diagram for Question 4 in the Diagram Booklet.’</p> <p>Diagram enlarged. Dashed lines made longer and thicker. Right angles made more obvious.</p> <p>Wording added: ‘All the marked angles are right angles.’</p> <p>‘AB = 11 metres’; ‘BC = 7 metres’; ‘DE = 7 metres’; ‘EF = 9 metres’</p>	Standard mark scheme

PAPER: 1MA1_2H		
Question	Modification	Mark scheme notes
5	<p>Wording added ‘Look at the diagram for Question 5 in the Diagram Booklet. It shows shape ABC.’ Shape labelled with A, B and C. Wording added: ‘ABC is the right angle’; ‘AC = 14.5 cm’; ‘BC = x cm’; ‘angle ACB = 53°’ Diagram enlarged. Right angle made more obvious. Angle moved outside smaller angle arc.</p>	Standard mark scheme
7	<p>Wording added ‘Look at the diagram for Question 7 in the Diagram Booklet.’ The wording ‘Here is’ removed and replaced with ‘It shows’. Diagram enlarged and intermediates marked. Axes labels moved above the vertical axis and right on the horizontal axis. Open headed arrows. Small squares removed.</p>	Standard mark scheme
9	Equations stacked vertically and left aligned.	Standard mark scheme
11	<p>Wording added ‘Look at Diagram 1 and Diagram 2 for Question 11 in the Diagram Booklet.’ Wording added ‘in Diagram 1 of the Diagram Booklet’. Graphs enlarged. Axes labels moved to above the vertical axis and left on the horizontal axes. Right axis labelled on Diagram 1. Small squares removed. Open headed arrows. Curve values changed to pass through grid lines (20,0), (40,15), (50,30), (65,45) and (90,60). Information left aligned. Values changes: 24 to 20; 96 to 90 Wording added ‘in Diagram 2 of the Diagram Booklet’.</p>	Standard mark scheme but B1 changed to correctly identifying one of the LQ (40) Median (50) or UQ (65) from the CF graph and the box plot drawn with lower value 20 and upper value 90
12	Equation left aligned.	Standard mark scheme
16	<p>Wording added ‘Look at the diagram for Question 16 in the Diagram Booklet.’ Wording added ‘in the Diagram Booklet’. Axes labels moved to above the vertical axis and right on the horizontal axis. Diagram enlarged. Shading changed. Graph lines thickened. Open headed arrows.</p>	Standard mark scheme
17	<p>Wording added ‘Look at the diagram for Question 17 in the Diagram Booklet. You may be provided with models. They are not accurate.’ The wording ‘The diagram shows’ removed and replaced with ‘The diagram and the models show’. Diagrams enlarged, stacked vertically and left aligned. Right angles made more obvious. Shading changed. Models provided with labels.</p>	Standard mark scheme

PAPER: 1MA1_2H		
Question	Modification	Mark scheme notes
18	<p>Wording added 'Look at the diagram for Question 18 in the Diagram Booklet.'</p> <p>The wording 'Here is' removed and replaced with 'It shows'.</p> <p>Diagram enlarged and made horizontal along the longest side.</p> <p>Triangle points labelled A, B and C. Angle moved outside angle arc and arc made smaller.</p> <p>Wording added: 'AB = 11.2 cm'; 'BC = 4.3 cm'; 'Angle ABC = 118°'</p>	Standard mark scheme
20	<p>Wording added 'Look at Diagram 1, Diagram 2 and Diagram 3 for Question 20 in the Diagram Booklet. You may be provided with a model. It is not accurate.'</p> <p>Diagram 2 and Diagram 3 added. Thick line AH added to Diagram 1 and angle arc.</p> <p>Diagrams enlarged. Dashed lines made</p>	Standard mark scheme
21	<p>Wording added 'Look at the diagram for Question 21 in the Diagram Booklet.'</p> <p>Diagram enlarged. Small squares removed.</p> <p>Axes labels moved above the vertical axis and left on the horizontal axis.</p> <p>Curve moved down to pass through (17.5,10) to allow visually impaired students to use grid lines. Right axis labelled.</p>	Standard mark scheme



Pearson
Edexcel

Mark Scheme (Results)

November 2022

Pearson Edexcel GCSE (9 – 1)
In Mathematics (1MA1)
Higher (Calculator) Paper 3H

Paper: 1MA1/3H

Question	Answer	Mark	Mark scheme	Additional guidance																				
1	$a = \frac{p+9}{3}$	M1 A1	for correct first step to rearrange, eg $p + 9 = 3a - 9 + 9$ or $\frac{p}{3} = \frac{3a-9}{3}$ oe or answer ambiguously shown eg $a = p + 9 \div 3$ or answer given as $\frac{p+9}{3}$ oe	May be seen in different equivalent forms but must be carried out, not just intention seen.																				
2	Description	C1	Identifies a mistake in the working Acceptable examples Rob should divide by 8 He should have added the 3 and 5 first He divided 120 by 3 and 5 instead of 8 He did not do it as $120 \times \frac{3}{8}$ and $120 \times \frac{5}{8}$ He did not add the two ratios first Not acceptable examples He has done it in two parts but he should do it in one The answer should be 45 : 75 They do not add up to 120 He is supposed to add his numbers 40 + 24 does not equal 120																					
3	22	P1 P1 A1	for process to find total German eg $200 - 104 - 70 (= 26)$ for complete process to find boys choosing Spanish eg $90 - (60 + ("26" - 18))$ cao for process to find girls choosing French, eg $104 - 60 (= 44)$ or girls total, eg $200 - 90 (= 110)$ for complete process to find boys choosing Spanish eg $70 - ("110" - "44" - 18)$	<table border="1"> <thead> <tr> <th></th> <th>F</th> <th>S</th> <th>G</th> <th>total</th> </tr> </thead> <tbody> <tr> <td>girls</td> <td>44</td> <td>48</td> <td>18</td> <td>110</td> </tr> <tr> <td>boys</td> <td>60</td> <td>22</td> <td>8</td> <td>90</td> </tr> <tr> <td>total</td> <td>104</td> <td>70</td> <td>26</td> <td>200</td> </tr> </tbody> </table>		F	S	G	total	girls	44	48	18	110	boys	60	22	8	90	total	104	70	26	200
	F	S	G	total																				
girls	44	48	18	110																				
boys	60	22	8	90																				
total	104	70	26	200																				

Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
4	Yes (supported)	P1 P1 P1 C1	<p>for a process to find the volume of 1 tank eg $\pi \times 40^2 \times 160$ (= 804247.7... or 804.2... or 256000π)</p> <p>for complete process to find the volume of 4 tanks, [volume of tank] \times 4 eg $\pi \times 40^2 \times 160 \times 4$ (= 3216990.8... or 3216.9... or 1024000π) or for process to find volume of fertiliser available per tank eg $32 \times 1000 \div 4$ (= 8000)</p> <p>for a process to find the volume of fertiliser needed for 1 tank eg [volume of tank] \div 101 (= 7962.8...) or 4 tanks (= 31851.3...) OR for a process to find volume of mixture that 32 litres of fertiliser will make eg 32000×101 (= 3232000) or 32×101 (= 3232)</p> <p>for Yes supported by correct figures shown eg a comparable figure in the range 31.8 to 31.9 (litres) or in the range 31800 to 31900 with 32000 (cm³) or in the range 3216 to 3217 with 3232 (litres) or in the range 3216000 to 3217000 with 3232000 (cm³) or in the range 7958 to 7963 with 8000 (cm³)</p>	<p>Values can be truncated or rounded</p> <p>For this mark, [volume of tank] must come from a calculation involving π, r^2, h</p> <p>For this mark, [volume of tank] must come from a calculation involving π, r^2, h or be stated as their volume.</p> <p>There are other possible pairs of values which can be used in the comparison</p>
5 (a)	16	M1 A1	<p>for a ratio of $\frac{20}{5}$ or $\frac{5}{20}$ or 4 or 0.25 or $\frac{5}{4}$ or $\frac{4}{5}$ or 1.25 or 0.8 oe</p> <p>cao</p>	
(b)	5.5	M1 A1	<p>for $22 \times \text{“0.25”}$ or $22 \div \text{“4”}$ oe</p> <p>oe</p>	

Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
6 (a)	0.7	B1	for 0.7 on the first branch	Accept equivalent fractions or percentages for probabilities
	0.65, 0.65	B1	for 0.65, 0.65 on the second branches	
(b)	0.105	M1	for 0.3×0.35	
		A1	oe	
7 (a)	0.008	B1	for 0.008 or 8×10^{-3}	May be awarded at any stage
(b)	50	M1	for conversion from km to m eg $180 \times 1000 (= 180\ 000)$ or for conversion from hours to seconds eg $180 \div (60 \times 60) (= 0.05)$ or for conversion from km per hour to metres per second, eg $1000 \div (60 \times 60) (= 0.277\dots)$ (Accept $(60 \times 60) \div 1000 (= 3.6)$)	
		M1	for a complete process eg $180 \times 1000 \div 3600$	
		A1	cao	
8	158	P1	for a first step in the process eg $50 \times 167.6 (= 8380)$ or $20 \times 182 (= 3640)$	
		P1	for a complete process eg $(50 \times 167.6 - 20 \times 182) \div 30$ or $\frac{8380 - 3640}{30}$ or $4740 \div 30$	
		A1	cao	

Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
9	(a) 0.000675	B1	cao	If the answer (for 2 marks) is seen in working and then rounded or truncated, award full marks.
	(b) 6.592×10^5	M1	for 10.5472×10^3 oe or 1.6×10^8 oe or 2.575×10^{-1} oe or for 6.592×10^n where $n \neq 5$ or for 6.59×10^5 or for 6.6×10^5 or for 659200 oe	
		A1	cao	
10	Explanation	C1	for full explanation indicating the problem with the negative signs Acceptable examples He should have $+2x + 4$ on the second line He should have done $--4$ and $--2x$ $3x - -2x = 5x$, not $1x$ Two minuses make a plus which he didn't account for Not acceptable examples He has not expanded the brackets Peter has to factorise first He did not collect the terms He didn't include the x^2	
11	5, 6, 7	M1	for identification of possible values of x (4,5,6,7) or of y (5,6,7,8,9)	Could be shown on a number line or using a Venn diagram This mark can be awarded for an answer of 4, 5, 6, 7 Answers may be given in any order.
		A1	cao	
12	1.2, 1.3	B1	for 1.2 in the correct position	Accept $1.2\dot{9}$ or 1.299... must be 9 recurring.
		B1	for 1.3 in the correct position	

Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
13	Statements	C1	Makes reference to the fact that the label on the horizontal axis is missing	
		C1	Makes reference to the fact that the graph has not been plotted at the top end of the class intervals, eg has plotted at midpoints	
14	(a)	B2	cao	
		(B1	for two of 81, x^{20} , y^{24})	
	(b)	M1	for method to find the product of any two linear expressions (3 out of 4 terms correct or 4 correct terms ignoring signs), eg $x^2 + 2x - 3x - 6$ or $x^2 + 2x + 4x + 8$ or $x^2 + 4x - 3x - 12$	Note that, for example $-x - 6$ in expansion of $(x + 2)(x - 3)$ is regarded as 3 correct terms.
		M1	for a complete method to find all terms, at least half of which are correct (ft their first product), eg $x^3 + 4x^2 + 2x^2 - 3x^2 + 8x - 6x - 12x - 24$	First product must be quadratic with at least 3 terms but need not be simplified or may be simplified incorrectly
		A1	cao	
15	Shown	M1	for one correct product eg $7 \times 5 (= 35)$ or $13 \times 5 (= 65)$ or $7 \times 13 \times 5 (= 455)$	Ignore additional products
		C1	for showing three correct products added eg $35 + 65 + 455$	There is no need to show the three products sum to 555

Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
16	40	M1	for $ABD = 120$ and $AED = 60$ or for using the properties of a cyclic quadrilateral eg $EAB + BDE = 180$	Angles may be shown on the diagram
		M1	for using the ratio of 2 : 1 eg showing sizes of angles such that $EAB : BCD = 2 : 1$	May be expressed using algebra eg $EAB = 2x$ and $BCD = x$
		M1	(dep on M1) for linking an angle from the cyclic quadrilateral with angle(s) in the triangle (other than $EAB : BCD = 2 : 1$) eg $BDE = BCD + 60$ or $BDE = 180 - BDC$ or $EAB + BCD + AEC = 180$	Could be expressed using algebra eg $x + 60 = 180 - 2x$
		A1	for $BCD = 40$ from correct working	
17	42 : 63 : 15 : 20	P1	for a first step to write a relationship between 2 weights, eg $A + B : C + D = 3 : 1$ or $A : B = 2 : 3$ or $C : D = 3 : 4$ or $A + B = 3(C + D)$ or $A = \frac{2}{3}B$ or $C = \frac{3}{4}D$	
		P1	for giving all 3 relationships in the same form eg $A + B : C + D = 3 : 1$ and $A : B = 2 : 3$ and $C : D = 3 : 4$ or $A + B = 3(C + D)$ and $A = \frac{2}{3}B$ and $C = \frac{3}{4}D$	
		P1	for complete process to link all 4 weights, eg $\frac{2}{3}B + B = 3\left(\frac{3}{4}D + D\right)$ and $A = \frac{2}{3}B$ and $C = \frac{3}{4}D$ or $A : B : C : D = A : 63 : C : 20$ and $A = \frac{2}{3}B$ and $C = \frac{3}{4}D$ or $C : D = 3 : 4$ and $A : B : D = 42 : 63 : 20$	
		A1	oe	

Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
18	Description	C1 C1	for translation for $\begin{pmatrix} 8 \\ 0 \end{pmatrix}$	Award no marks if more than one transformation May be described as, for example “by 8 units in the direction of the x axis”
19	16	P1 A1	for $\text{Prob}(\text{R or G}) = 1 - 0.4 (= 0.6)$ or for (number of red or green counters) = $50 - 0.4 \times 50 (= 30)$ or for use of ratio, eg [probability] $\times \frac{8}{15}$ (= 0.32) or [number of counters] $\times \frac{8}{15}$ for a complete process to find number of green counters, eg $(1 - 0.4) \times \frac{8}{15} \times 50$ or for $\frac{16}{50}$ cao	[probability] may be 0.4 or 0.6 [number of counters] may be 20 or 50
20	Proof	C1 C1 C1	for angle $EAC = \text{angle } EDB$ (Base angles of an <u>isosceles triangle</u> are equal) or for explanation that $AB + BC = BC + CD$ using ratio so $AC = DB$ oe or $AE = DE$ (given) for at least 2 correct pairings with reasons for a complete proof including all reasons given and SAS	Reasons must be linked to their method.

Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
21	(7, -196) supported	P1 P1 A1	for process as far as $4(x^2 - 14x)$ or $(2x - 14)^2 + c$ or for $(x - 7)^2 - 49$ for full process to complete the square eg $4((x - 7)^2 - 49)$ or $(2x - 14)^2 - 196$ for conclusion from correct use of completing the square	c may be 0
22	$a = 4$ $b = 110$	M1 M1 A1	for writing at least one of the 3 terms with a denominator of $(x^2 - 25)$ or $(x - 5)(x + 5)$ eg. $\frac{(2x+3)(x+5)}{x^2-25}$ oe or $\frac{(x-4)(x-5)}{x^2-25}$ oe or $\frac{3(x^2-25)}{x^2-25}$ oe for $\frac{(2x+3)(x+5)}{x^2-25} + \frac{(x-4)(x-5)}{x^2-25} - \frac{3(x^2-25)}{x^2-25}$ oe or for $\frac{3x^2+4x+35}{x^2-25} (-3)$ or for $\frac{[3x^2+4x+35]}{x^2-25} - \frac{3(x^2-25)}{x^2-25}$ oe for $a = 4$ and $b = 110$	Students may work with a denominator of $(x - 5)(x + 5)$ for the award of the first 2 marks.
23	(a) Sketch (b) $y = -g(x)$	B1 B1	for appropriate sketch which crosses the x axis at $(-3, 0)$, $(-1, 0)$, $(0, 0)$ and passes through $(-2, 2)$ with end points in the correct square oe	Allow some tolerance on the points and in drawing the curve if the intention is clear Accept $-y = g(x)$

Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
24	Proof	C1	for $\overrightarrow{CE} = 2\mathbf{a} - \mathbf{b}$ oe	Vectors may be seen on diagram. Award marks provided not ambiguous. For the award of the first 3 marks, expressions for vectors \overrightarrow{CE} , \overrightarrow{EP} , \overrightarrow{CP} , \overrightarrow{CF} and \overrightarrow{DP} may not be simplified
		C1	for $\overrightarrow{EP} = 2\mathbf{a} - \mathbf{b}$ oe or for $\overrightarrow{CP} = 4\mathbf{a} - 2\mathbf{b}$ oe	
		C1	for $\overrightarrow{CF} = \mathbf{a} - \mathbf{b}$ oe or for $\overrightarrow{DP} = 2\mathbf{a} - 2\mathbf{b}$ oe	
		C1	for $\overrightarrow{CF} = \mathbf{a} - \mathbf{b}$ and $\overrightarrow{DP} = 2\mathbf{a} - 2\mathbf{b}$ (or $2(\mathbf{a} - \mathbf{b})$) leading to conclusion	
25	14.1	P1	for a process to find the volume of the top eg $92.8 \div 2.9 (= 32)$	Values can be truncated or rounded For this mark, [total volume] does not have to come from a correct process but is the value that the student believes is the total volume of the pyramid.
		P1	for finding total mass of P eg $92.8 + 972.8 (= 1065.6)$	
		P1	for finding total volume of P eg $\frac{"1065.6"}{4.7} (= 226.7234)$	
		P1	(dep P2) for $\frac{"32"}{[\text{total volume}]} \times 100$	
		A1	for answer in the range 14.1 to 14.2	

Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
26	15.8	P1	<p>starts process by finding an angle, eg exterior angle = $360 \div 7$ (= 51.42...) or interior angle = $\frac{900}{7}$ or $180 - (360 \div 7)$ (= 128.57...) oe</p>	<p>Accept values to 3 figures rounded or truncated</p> <p>Any symbols used in formulae must be consistent with any labels on the diagram.</p> <p>For this mark, [128.5...] does not have to come from a correct process but is the value that the student believes is the interior angle.</p>
		P1	<p>start of process to find length of side by using area, eg $\frac{1}{2} \times AB \times AG \times \sin GAB = 30$ oe or $\frac{1}{2} \times a \times b \times \sin [128.5 \dots] = 30$ oe or $\frac{1}{2} \times x \times x \times \sin [128.5 \dots] = 30$ oe or $\frac{1}{2} \times AG \times \frac{1}{2}GB \times \sin AGB = 15$ oe or for a relationship linking GB and h, $\frac{1}{2} \times GB \times h = 30$ oe</p>	
		P1	<p>for process to find the length of a side of the polygon eg $\sqrt{\frac{2 \times 30}{\sin "128.5..."}}$ oe (= 8.76...) or for process to get a second relationship linking AG and $\frac{1}{2}GB$, eg $AG \times \cos "25.7..." = \frac{1}{2}GB$ oe or for process to get a second relationship linking GB and h, eg $\tan "25.7..." = \frac{h}{\frac{1}{2}GB}$ oe</p>	

Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
		P1	<p>for complete process to find GB</p> <p>eg $\frac{"8.76..." \times \sin "128.5..."}{\sin "25.7..."}$ oe</p> <p>or</p> <p>$\sqrt{"8.76"{}^2 + "8.76"{}^2 - 2 \times "8.76"{}^2 \times \cos "128.5..."}$ oe</p> <p>or</p> <p>$2 \times "8.76..." \times \sin "64.2..."$ or $2 \times "8.76..." \times \cos "25.7..."$ oe</p> <p>or $\sqrt{\frac{2 \times 60}{\tan "25.7..."}}$ oe</p>	
		A1	for answer in the range 15.7 to 15.8	

Modifications to the mark scheme for Modified Large Print (MLP) papers: 1MA1 3H

Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme. Notes apply to both MLP papers and Braille papers unless otherwise stated.

The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:

Angles: $\pm 5^\circ$

Measurements of length: ± 5 mm

PAPER: 1MA1_3H		
Question	Modification	Mark scheme notes
1	Value changed: a to n	Standard mark scheme but note change of letter.
2	Equations stacked vertically and moved left with equals symbols aligned.	Standard mark scheme
4	Wording added 'Look at the diagram for Question 4 in the Diagram Booklet. You may be provided with a model. It is not accurate.' Diagram enlarged. Model provided. '160cm' label moved to left side.	Standard mark scheme
5	Wording added 'Look at the diagram for Question 5 in the DB.' Diagrams stack vertically and enlarged. Angle arcs made smaller. Arcs at C and F separated more. Wording added: $AC = 5 \text{ cm}$; $BC = 4 \text{ cm}$; $DE = 22 \text{ cm}$; $DF = 20 \text{ cm}$; 'Angle $ABC = \text{Angle } DEF$ ' ; 'Angle $ACB = \text{Angle } DFE$ '	Standard mark scheme
6	Wording added 'Look at the diagram for Question 6 in the DB.' Diagram enlarged.	Standard mark scheme
11	Left align information. Values changed: x to p, y to q	Standard mark scheme but note change of letters
13	Wording added 'Look at the diagram for Question 13 in the Diagram Booklet.' The word 'this' removed and replaced with 'the'. Wording added 'in the table below'. Table and diagram enlarged. Open headed arrows. Crosses changed to dots. Small squares removed. The word 'this' removed and replaced with 'the'. Wording added 'in the Diagram Booklet'.	Standard mark scheme
14	(b) Value changed: x to y	Standard mark scheme but note change of letter
15	Wording added 'Look at the information for Q15 in the Diagram Booklet. It shows details about the fish in a pet shop.' Information moved to the Diagram Booklet and left aligned	Standard mark scheme
16	Wording added 'Look at the diagram for Question 16 in the Diagram Booklet.' Diagram enlarged. Angle moved outside the angle arc. Angle arc made smaller. Ratio left aligned.	Standard mark scheme
20	Wording added 'Look at the diagram for Question 20 in the Diagram Booklet.' The wording 'The diagram' removed and replaced with 'It'. Diagram enlarged	Standard mark scheme

PAPER: 1MA1_3H

Question		Modification	Mark scheme notes
23	(a)	Wording added 'Look at the diagram for Question 23(a) in the Diagram Booklet. It shows'. The wording 'is shown on the grid below' removed. Diagram enlarged. Open headed arrows. Axes labels moved above the vertical axis and right on the horizontal axis. Wording added 'in the Diagram Booklet'.	Standard mark scheme
23	(b)	Wording added 'Look at the diagram for Question 23(b) in the Diagram Booklet.' The word 'this' removed and replaced with 'the'. Wording added 'in the Diagram Booklet'. Diagram enlarged. Open headed arrows. Axes labels moved above the vertical axis and right on the horizontal axis. Graph B line made dashed. Key added to show graph line A and graph B. Odd numbers removed from X axis.	Standard mark scheme
24		Wording added 'Look at the diagram for Question 24 in the Diagram Booklet. It shows'. Diagram enlarged. Open headed arrows.	Standard mark scheme
25		Wording added 'Look at Diagram 1 and Diagram 2 for Question 25 in the Diagram Booklet. You may be provided with a model. It is not accurate.' Diagram enlarged. Diagram added to show side view. Labels moved to left side. Dashed lines longer and thicker. Model provided.	Standard mark scheme
26		Wording added 'Look at the diagram for Question 26 in the Diagram Booklet.' Wording added 'Points G and B are joined to form triangle ABG.' Diagram enlarged.	Standard mark scheme

