



Mark Scheme (Results)

Summer 2023

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 |
| 3 | 125 | P1 P1 P1 A1 | for process to find area of one face, eg $150 \div 6 (= 25)$ or $6x^2 = 150$ for process to find side length, eg $\sqrt{25} (= 5)$ for a complete process to find volume, eg “5” \times “5” \times “5” or “25” \times “5” cao | where x is the length of one side |
| 4 | Frequency polygon drawn (2.5, 8), (7.5, 24) (12.5, 13) (17.5, 11) (22.5, 4) | B2 (B1 | for fully correct frequency polygon with points plotted at the midpoints for all points plotted correctly but not joined with line segments or points plotted at correct heights not at midpoints but consistently within each interval and joined with line segments or correct frequency polygon with one point incorrect or correct frequency polygon with first and last points joined directly) | Joining must be with line segments Accept points plotted within half a small square Ignore any histogram drawn and any part of a frequency polygon outside range of first and last points plotted for example, at 0, 5, 10,...or at 5, 10, 15,... |

| Paper: 1MA1/1H | | | | |
|----------------|-------------|------------------------|---|--|
| Question | Answer | Mark | Mark scheme | Additional guidance |
| 6 (a) | Description | C1 | <p>for a valid description of the relationship</p> <p>Acceptable examples</p> <p>As age increases, weight increases</p> <p>The older you are the greater the weight</p> <p>Positive correlation</p> <p>Not acceptable examples</p> <p>Positive (relationship)</p> <p>age and weight are in proportion</p> <p>strong correlation or correlation is increasing</p> <p>as the babies get older the heavier they get, negative correlation</p> <p>they are directly proportional, weight goes up as age goes up</p> | Accept positive correlation Ignore any comment about strength |
| (b) | 2.5 to 4.5 | B2 (B1 | <p>for an answer in the range 2.5 to 4.5</p> <p>for a suitable line of best fit drawn or for a point on the grid at $(x, 5.8)$ where x lies between 2.5 and 4.5 or a horizontal line drawn from 5.8 across to $(x, 5.8)$ where x is in the range 2.5 to 4.5)</p> | |
| 7 | 1200 | M1 A1 | <p>for a fully correct method, eg $240 \div 0.2$ or 240×5 oe</p> <p>cao</p> <p>SC B1 for an answer of 960 or 1440 if M0 scored</p> | |
| 8 | 3 | P1 P1 A1 | <p>for process to find area of base, eg $1200 \div 40 (= 30)$</p> <p>for process to find pressure, eg $90 \div "30"$</p> <p>cao</p> | |

| Paper: 1MA1/1H | | | | |
|----------------|---------------------|---|--|--|
| Question | Answer | Mark | Mark scheme | Additional guidance |
| 9 | $x = 6$ $y = -2$ | B1 | cao | |
| 10 | 140 | <p>P1</p> <p>P1</p> <p>P1</p> <p>A1</p> | <p>for process to find sum of the interior angles of a pentagon eg $180 \times (5 - 2)$ (= 540) oe</p> <p>(dep P1) for process to use ratio 4 : 1, eg labels as $4x$ and x or as x and $\frac{1}{4}x$ or $110 + 135 + 120 + 4x + x = \text{“540”}$ or for $\text{“540”} - 110 - 135 - 120$ (= 175)</p> <p>for process to find angle ABC or angle AED eg $\text{“175”} \div (4 + 1)$ (= 35) or $\text{“175”} \div (4 + 1) \times 4$</p> <p>cao</p> | <p>Angles must be clearly labelled on the diagram or otherwise identified. Correct method can be implied from angles on the diagram if no ambiguity or contradiction.</p> <p>Ratio must be used correctly if awarded for diagram</p> <p>A correct answer with no supportive working gets 0 marks</p> |

| Paper: 1MA1/1H | | | | |
|----------------|-----------|-------------------------------|--|--|
| Question | Answer | Mark | Mark scheme | Additional guidance |
| 11 | $3x^7y^2$ | <p>M1</p> <p>M1</p> <p>A1</p> | <p>for full evaluation of numerator or denominator with at least 2 of 3 terms correct in a product, eg $36x^{10}y^6$ or $12x^3y^4$</p> <p>or full evaluation of $\frac{6x^5y^3}{3x^2y^7}$ or $\frac{6x^5y^3}{4xy^{-3}}$ with at least 2 of 3 terms correct in a product, eg $2x^3y^{-4}$ or $1.5x^4y^6$</p> <p>for correct evaluation of numerator and denominator, eg $36x^{10}y^6$ and $12x^3y^4$</p> <p>or for full evaluation of numerator and denominator with no more than one error and a final answer of the form ax^by^c with two of a, b and c correct</p> <p>or for correct evaluation of $\frac{6x^5y^3}{3x^2y^7}$ and $\frac{6x^5y^3}{4xy^{-3}}$ eg $2x^3y^{-4}$ and $1.5x^4y^6$</p> <p>or for full evaluation of $\frac{6x^5y^3}{3x^2y^7}$ and $\frac{6x^5y^3}{4xy^{-3}}$ with no more than one error and a final answer of the form ax^by^c with two of a, b and c correct</p> <p>for $3x^7y^2$ oe</p> | <p>Accept $a = 3$, $b = 7$, $c = 2$</p> |

| Paper: 1MA1/1H | | | | |
|----------------|-----------------|--|--|---|
| Question | Answer | Mark | Mark scheme | Additional guidance |
| 12 | $\frac{62}{72}$ | M1 A1 | <p>for one correct product, eg $\frac{5}{8} \times \frac{7}{9} (= \frac{35}{72})$ oe or $\frac{3}{8} \times \frac{2}{9} (= \frac{6}{72})$ oe or $\frac{3}{8} \times \frac{7}{9} (= \frac{21}{72})$ oe or $\frac{5}{8} \times \frac{2}{9} (= \frac{10}{72})$ oe</p> <p>M1 for a full method, eg $\frac{5}{8} \times \frac{7}{9} + \frac{3}{8} \times \frac{2}{9} + \frac{3}{8} \times \frac{7}{9}$ oe or $1 - \frac{5}{8} \times \frac{2}{9}$ oe</p> <p>A1 for $\frac{62}{72}$ oe eg $\frac{31}{36}$</p> | |
| 13 | 80 | M1 M1 A1 | <p>for setting up an equation with a constant term, eg $y = kx$ oe or $24 = k \times 1.5$ oe or $k = 16$ or for starting to work with direct proportion, eg $24 \div 1.5 (= 16)$ or $5 \div 1.5 (= 3.33\dots)$</p> <p>M1 for substituting in $y = kx$, eg $y = "16" \times 5$ or for a complete method, eg $24 \div 1.5 \times 5$ or $5 \div 1.5 \times 24$</p> <p>A1 cao</p> | Condone the use of “α” instead of “=” for the M marks |

| Paper: 1MA1/1H | | | | |
|----------------|----------|------|---|--|
| Question | Answer | Mark | Mark scheme | Additional guidance |
| 14 (a) | 4^{-2} | B1 | for 4^{-2} | Accept $n = -2$ |
| (b) | 5 | M1 | for $8^{\frac{5}{3}} = (\sqrt[3]{8})^5$ or 2^5 or $\sqrt[3]{8^5}$ or $\sqrt[3]{32768}$ or $9^{\frac{3}{2}} = (\sqrt{9})^3$ or 3^3 or $\sqrt{9^3}$ or $\sqrt{729}$ | |
| | | M1 | for correctly evaluating $8^{\frac{5}{3}}$ or $9^{\frac{3}{2}}$, eg 32 or 27 seen | |
| | | A1 | cao | |
| 15 | 3 | P1 | for process to make the y term the subject of $6y + kx - 12 = 0$ eg $6y = 12 - kx$ or $y = 2 - \frac{k}{6}x$ | A correct answer with no supportive working gets 0 marks |
| | | P1 | for process to find gradient of line perpendicular to L_1 , eg $2 \times m = -1$ or $m = -\frac{1}{2}$ or for process to find k , eg $-\frac{k}{6} \times 2 = -1$ | |
| | | A1 | cao | |

| Paper: 1MA1/1H | | | | |
|----------------|------------------|------|---|---------------------|
| Question | Answer | Mark | Mark scheme | Additional guidance |
| 18 | (c) 30 (t) 54 | P1 | <p>for setting up an equation, eg $7c + 5t = 480$ or $c : t = 5 : 9$ or $\frac{c}{t} = \frac{5}{9}$ or $9c = 5t$</p> <p>or for starting to work with ratio of total costs, eg $7 \times 5 (= 35)$ and $5 \times 9 (= 45)$ or $7 \times \frac{5}{14}$ and $5 \times \frac{9}{14}$ or $35 : 45$ or $7 : 9$</p> | |
| | | P1 | <p>for a process to eliminate c or t from correct equations, eg $7c + 9c = 480$ or $7 \times \frac{5t}{9} + 5t = 480$ or $7c + \frac{9c}{5} \times 5 = 480$</p> <p>or for $480 \div ("35" + "45") (= 6)$</p> <p>or for a process to find total cost of carrots or total cost of tomatoes, eg $480 \div ("7" + "9") \times 7 (= 210)$ or $480 \div ("7" + "9") \times 9 (= 270)$</p> | |
| | | P1 | <p>for a process to isolate t or c, eg $16c = 480$ or $80c = 2400$ oe or $80t = 4320$ oe</p> <p>or for one value correct eg $c = 30$ or $t = 54$</p> <p>or for a process to find cost of 1 kg of carrots or 1 kg of tomatoes, eg $5 \times "6" (= 30)$ or $9 \times "6" (= 54)$ or $"210" \div 7 (= 30)$ or $"270" \div 5 (= 54)$</p> | |
| | | A1 | cao | |

| Paper: 1MA1/1H | | | | |
|----------------|--------------|------------------------|--|---------------------|
| Question | Answer | Mark | Mark scheme | Additional guidance |
| 19 | 7 | P1 A1 | for process to use product rule to find number of desserts, eg $5 \times 12 \times \text{desserts} = 420$ or $420 \div (5 \times 12)$ oe cao | |
| 20 (a) | $(5x - 2)^2$ | M1 A1 | for a first step to change the subject of $y = \frac{\sqrt{x} + 2}{5}$ or $x = \frac{\sqrt{y} + 2}{5}$, eg $5y = \sqrt{x} + 2$ or $5x = \sqrt{y} + 2$ oe | |
| (b) | 55 | M1 M1 A1 | for method to find gf(x), eg $\frac{\sqrt{3x+4} + 2}{5}$ or method to find $g^{-1}(3)$, eg $(5 \times 3 - 2)^2 (= 169)$ for method to solve as far as 2 steps away, eg $(5 \times 3 - 2)^2 = 3x + 4$ or $3x + 4 = "169"$ or for a complete method, eg $(("169" - 4) \div 3)$ cao | |

| Paper: 1MA1/1H | | | | | |
|----------------|------------------------------|------|---|--|---------------------|
| Question | Answer | Mark | Mark scheme | | Additional guidance |
| 23 | $\frac{10\sqrt{3} + 27}{39}$ | M1 | for method to rationalise one of the fractions, eg $\frac{3\sqrt{3}}{4-\sqrt{3}} \times \frac{4+\sqrt{3}}{4+\sqrt{3}} (= \frac{12\sqrt{3}+9}{16-3})$ or $\frac{2}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} (= \frac{2\sqrt{3}}{3})$ oe | for method to write fractions with a common denominator, eg $\frac{3\sqrt{3} \times \sqrt{3}}{\sqrt{3}(4-\sqrt{3})} - \frac{2 \times (4-\sqrt{3})}{\sqrt{3}(4-\sqrt{3})}$ oe | |
| | | M1 | for method to rationalise both of the fractions eg $\frac{3\sqrt{3}}{4-\sqrt{3}} \times \frac{4+\sqrt{3}}{4+\sqrt{3}} (= \frac{12\sqrt{3}+9}{16-3})$ and $\frac{2}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} (= \frac{2\sqrt{3}}{3})$ oe | for writing as a correct single fraction without brackets, eg $\frac{9-8+2\sqrt{3}}{4\sqrt{3}-3}$ oe | |
| | | M1 | for method to write correct fractions with a common denominator eg $\frac{3(12\sqrt{3}+9)}{13 \times 3} - \frac{13 \times 2\sqrt{3}}{13 \times 3}$ or $\frac{36\sqrt{3}+27}{39} - \frac{26\sqrt{3}}{39}$ oe | for method to rationalise a fraction of the form $\frac{a+b\sqrt{3}}{c\sqrt{3}-d}$ where a, b, c and d are integers, eg $\frac{1+2\sqrt{3}}{4\sqrt{3}-3} \times \frac{4\sqrt{3}+3}{4\sqrt{3}+3}$ or $\frac{4\sqrt{3}+3+24+6\sqrt{3}}{48+12\sqrt{3}-12\sqrt{3}-9}$ oe | |
| | | A1 | for $\frac{10\sqrt{3}+27}{39}$ oe | | |

| Paper: 1MA1/1H | | | | |
|----------------|--------------------------|------|--|--|
| Question | Answer | Mark | Mark scheme | Additional guidance |
| 24 | $-2.5 < x < \frac{4}{3}$ | M1 | for method to find the critical values of $4x^2 - 25 < 0$ eg $(2x + 5)(2x - 5)$ or critical values -2.5 and 2.5 oe | accept use of = or incorrect inequality symbol for 1st and 3rd M marks |
| | | M1 | (dep on M1) for $x > -2.5$ and $x < 2.5$ or $x > a$ and $x < b$ where a and b are their critical values and $a < b$ | This may be implied by a suitable diagram |
| | | M1 | for method to find the critical values of $12 - 5x - 3x^2 > 0$ or $3x^2 + 5x - 12 < 0$ eg $(4 - 3x)(x + 3)$ or $(3x - 4)(x + 3)$ $\frac{- -5 \pm \sqrt{(-5)^2 - 4 \times (-3) \times 12}}{2 \times (-3)} \text{ or } \frac{-5 \pm \sqrt{5^2 - 4 \times 3 \times (-12)}}{2 \times 3}$ $3 \left[\left(x + \frac{5}{6} \right)^2 - \left(\frac{5}{6} \right)^2 \right] - 12 = 0$ oe or critical values -3 and $\frac{4}{3}$ oe | |
| | | M1 | (dep on previous M1) for $x > -3$ and $x < \frac{4}{3}$ or $x > c$ and $x < d$ where c and d are their critical values and $c < d$ | This may be implied by a suitable diagram |
| | | A1 | for $-2.5 < x < \frac{4}{3}$ oe eg $x < \frac{4}{3}, x > -2.5$ | A correct answer with no supportive working gets 0 marks |

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 |
| 4 | | Table enlarged and left aligned. Black outline and tracking lines added. Values changed in the table: 8 changed to 5; 24 changed to 25; 13 changed to 15; 11 changed to 10; 4 changed to 5 Wording ‘Draw’ removed and replaced with ‘Look at the diagram for Question 4 in the Diagram Booklet. It shows a blank grid. On the grid, draw’. Wording ‘this’ removed and replaced with ‘the’. Axes labels moved to the top of the vertical axis and to the left of the horizontal axis. Right axis labelled. Grid enlarged and small squares removed. Grid lines made black. Open headed arrows. | Standard mark scheme but note the change in points to be plotted. |
| 5 | | Wording added ‘Look at the diagram for Question 5 in the Diagram Booklet. It shows an incomplete Venn diagram.’ Wording added ‘in the Diagram Booklet’. Diagram enlarged. Labels changed to ‘set A’ and ‘set B’. For Braille add “Ans: (i) __ (ii) __ (iii) __ (iv) __” | Standard mark scheme |
| 6 | | Wording added ‘Look at the diagram for Question 6 in the Diagram Booklet. It shows a scatter graph with’. Wording removed ‘The scatter graph shows’. Axes labels moved to the top of the vertical axis and to the left of the horizontal axis. Right axis labelled. Grid enlarged and small squares removed. Grid lines made black. Open headed arrows. Crosses changed to dots. | |
| 6 | (b) | Wording added ‘in the Diagram Booklet’. Value changed from 5.8 kg to 6.0 kg. | B2 for an answer in the range 2.5 to 4.5 (B1 for a suitable line of best fit drawn or for a point on the grid at (x, 6) where x lies between 2.5 and 4.5 or a horizontal line drawn from 6 across to (x, 6) where x is in the range 2.5 to 4.5) |

| | | | |
|----|--|---|--|
| 8 | | <p>Wording added 'Look at the diagram for Question 8 in the Diagram Booklet. You may be provided with a model. They are NOT accurate. They show'.</p> <p>Wording removed 'The diagram shows'. Diagram enlarged.</p> <p>A floor added to the diagram, labelled 'Floor' to match the model provided.</p> <p>Label '40 cm' changed to 'height 40 cm'. Dashed lines made longer and thicker.</p> <p>Formula moved to top left of the diagram and frame removed. Model provided.</p> | Standard mark scheme |
| 9 | | <p>Wording added 'Look at the diagram for Question 9 in the Diagram Booklet. It shows two intersecting straight lines on a grid.' Equations moved outside the grid.</p> <p>Grid enlarged. Grid lines made black. Open headed arrows. Graph lines made thicker.</p> <p>Axes labels moved to the top of the vertical axis and to the right of the horizontal axis.</p> | Standard mark scheme |
| 10 | | <p>Wording added 'Look at the diagram for Question 10 in the Diagram Booklet. It shows a pentagon ABCDE'. Diagram enlarged. Angles moved outside angle arcs and angle arcs made smaller.</p> <p>Wording added 'Angle EAB = 120°; Angle BCD = 110°; Angle CDE = 135°'</p> | Standard mark scheme |
| 12 | | <p>Wording added 'Look at the diagram for Question 12 in the Diagram Booklet. It shows a probability tree diagram'. Diagram enlarged</p> | Standard mark scheme |
| 16 | | <p>Wording added 'Look at the diagram for Question 16 in the Diagram Booklet. You may be provided with two models. Model 1 is a sphere. Model 2 is made from two hemispheres showing the radius r. They are NOT accurate. The diagram shows a sphere.'</p> <p>Wording removed 'Here is a sphere'. Diagram enlarged. Dashed lines made longer and thicker.</p> <p>Radius label moved to the left. Open headed arrows.</p> <p>Formula moved to the top left of the diagram and frame removed.</p> | Standard mark scheme |
| 17 | | Change 'x' to 'y'. Change 'y' to 'x'. | Standard mark scheme but note the change in letters. |
| 21 | | <p>Wording added 'Look at the diagram for Question 21 in the Diagram Booklet.'</p> <p>Diagram enlarged. Angles moved outside angle arcs and angle arcs made smaller.</p> <p>Centre dot enlarged. Wording added 'Angle ABO = 51°; Angle BOD = 64°'</p> | Standard mark scheme |

| | | | |
|----|--|--|----------------------|
| 22 | | <p>Wording added ‘Look at the diagram for Question 22 in the Diagram Booklet. You may be provided with a model. They are NOT accurate. They show a cuboid ABCDEFGH.’</p> <p>Wording removed ‘ABCDEFGH is a cuboid’.</p> <p>Diagram enlarged. Dashed lines made longer and thicker. Dimensions added to the diagram.</p> <p>For Braille:</p> <p>Wedge added at FCA, marked y. Sentence changed to</p> <p>“Work out the size of the angle y, between FC and the plane ABCD.”</p> | Standard mark scheme |
|----|--|--|----------------------|

