Examiners' Report
Principal Examiner Feedback

Summer 2025

Pearson Edexcel International GCSE
In Mathematics A (4MA1) Paper 2H

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IGCSE Mathematics 4MA1 2H Principal Examiners Report

Candidates who were well prepared for this paper were able to make a good attempt at a majority of questions.

Candidates were less successful in producing a full treatment for Pythagoras theorem (Q10), differentiating functions (Q17) and completing the square, particularly for negative quadratics (Q25).

On the whole, working was shown and mostly easy to follow. Those candidates who produce untidy, unstructured written work to the extent that their writing is almost illegible risk losing marks. There were some instances where candidates failed to read the question properly; an example being question 21. Here some candidates could not find an expression of the surface area of the cuboid.

Simplifying indices (Q15), making the subject of a formula (Q16), interpreting information to complete a Venn diagram (Q20), and manipulation of algebra in later questions (Q23), proved to be challenging for many. Compound interest in a context (Q7), also caused difficulty for less able candidates. Understanding what is needed to communicate a mathematical process (Q3) proved challenging for some candidates, as has been true in previous years.

Generally, problem solving, and questions assessing mathematical reasoning (Q2, Q8, and Q13) were tackled well.

Comments on individual questions

Question 1

This question proved to be accessible for most candidates, with most achieving full marks or 2 out of 3 marks. Errors made included getting mixed up with the statistical terms of mode, median and range and sometimes confusing it with mean; some candidates were calculating the mean.

The most common error was to give 7.5 as the value of for the fourth box indicating a failure to realise that the median would be $\frac{6+a}{2}=7.5$. After this a number of responses just listed 4,5 and 6, which perhaps fortunately scored the mark for the mode

Question 2

(a) This was generally answered well. If incorrect, most candidates increased the shape successfully but did not draw it in the correct position, this was awarded 1 mark for having the shape in the correct size and orientation.

(b) The question asks for a single transformation. Answers that gave more than one transformation, quite commonly seen, automatically lost the first mark. Common errors were using the word 'turn' rather than 'rotation', writing the centre of the rotation as a vector rather than a coordinate. The most common incorrect transformation was either a translation or a reflection.

Question 3

Most candidates now know what is expected of them in a 'show that' question and it was pleasing to see many answers gaining full marks, clearly understanding the need to show either $\frac{79}{21}=3\frac{16}{21}$ as their final stage or that $3\frac{16}{21}=\frac{79}{21}$ as the first stage of working.

Candidates who lost marks generally went straight from $\frac{22}{3}-\frac{25}{7}$ to $\frac{79}{21}$ failing to show $\frac{154}{21}-\frac{75}{21}$.

Candidates who separated the whole numbers and fractions and dealt with them in two parts often did not have sufficient method for a 'show that' question, going straight from $7\frac{7}{21}-3\frac{12}{21}$ to $3\frac{16}{21}$, failing to show $6\frac{28}{21}-3\frac{12}{21}$ and that 6 – 3 = 3

Very few candidates did not know that a common denominator was needed, but those who scored no marks generally made an error with writing the fractions as improper fractions with $\frac{26}{7}$ seen instead of $\frac{25}{7}$.

Question 4

Candidates need to ensure they use a sufficiently dark pencil for their work to be visible.

A multitude of triangles, circles etc around the line *AB* were offered by a minority of candidates who had no idea how to proceed. Others who produced one pair of intersecting arcs and then used a protractor to draw the bisector scored one mark.

A number of candidates drew a pair of touching circles centred on *A* and *B*. Arcs of the same radius, from *A* and *B*, above and below the line *AB*, clearly intersecting, were needed to secure the first mark. Pairs of parallel arcs above *AB* only and then joined up to extrapolate down to *AB* scored one mark.

In a minority of cases candidates produced two arcs at an equal distance from *A* and *B*, intersecting the line *AB*. The required intersecting arcs were then constructed from these two points and this was accepted as a valid method. Some candidates lost a mark where they had the correct intersecting arcs but failed to draw in the line.

Some students knew what to do but clearly did not use a pair of compasses, trying to imitate arcs drawn by a pair of compasses.

Question 5

Many candidates produced completely correct solutions to both parts of this question on proportionality.

(a) Scale factors were the most popular approach, usually *GH* = 10 ÷ 4 and then 2.5 × 5 to find a correct answer of 12.5

(b) Scale factors were still widely used but proportionality statements such as $\frac{y}{24} = \frac{4}{10}$ also appeared regularly. Scale factors were sometimes used incorrectly, multiplying instead of dividing.
Candidates should show all their working out as some candidates just gave answers only.

Question 6

This question was generally done well

Many candidates scored full marks and made a good start to this question. Those who did not nearly always scored 1 mark for finding 240 ÷ 12 = 20 and then continued to work out the values of 60, 80 and 100. At this stage some candidates misinterpreted the question for subtracting or adding the values of 10 to the incorrect numbers. A common error was to subtract 10 from 60, subtract 10 from 80 and add 20 to 100 to find the values 50, 90 and 120 thus losing the second mark.

Many candidates were successful in finding the values of 80, 70 and 90 but did not write their final answer in simplified form.

Many candidates gained 3 marks by leaving their final answer as 4 : 3.5 : 4.5 (dividing their values of 80, 70 and 90 by 20). Answers given in a different order gained credit if clearly labelled.

Question 7

This question was answered well. Most correct answers were gained by the shortest method i.e. 4000×1.07^3. There were a few who incorrectly gave a simple interest answer or used a multiplier of 107 instead of 1.07 leading to a very large amount of money, which should have indicated an error in their method. Some were successful using a build-up approach building up the value year by year. Less valid approaches included treating the 7% as simple interest or depreciating the bracelet's value often using 0.93

Additionally, candidates need to be aware that the use of the % sign in a calculation such as
(1 + 7%) risks losing method marks. The correct working to show is (1 + 0.07) or $\left(1+\frac{7}{100}\right)$. Candidates are encouraged to write down the correct notation so that marks can be awarded for their correct method.

Question 8

The majority of the candidates attempted this question with most choosing elimination as their method. Many of the candidates recognised the need to have equal *x* or *y* coefficients in the two equations, however some then chose the wrong operation to eliminate a variable and so were not credited. Those that found the value of one variable generally went on to use substitution successfully to find the value of the second variable. A number of candidates used substitution from the start, mainly with success although errors were sometimes made rearranging one equation to make one variable the subject. A small number of students made an error after $-17.5x = 25.5$ concluding $x = 1.5$. Where 2 marks were scored, it was mainly down to making mistakes in the multiplication but following through correctly.

Candidates recognise the need for working so although this could be solved using the calculator there were very few attempts without working.

Many elegant and concise solutions were seen.

Question 9

(a) There were many successful answers to this part of the question. Candidates who gained one mark could separate the *t* terms on one side and the numbers on the other side. These candidates could rearrange to obtain $-5t < 8$ then divided by -5 but gave an answer of $t < -1.6$ oe instead of $t > -1.6$ i.e. many did not realise what has to be done with the sign when dividing by a negative.

(b) Most candidates scored some marks on this question. The award of two marks was relatively frequent and shows that these candidates could correctly identify **two** of the lines bordering the region, $x \geq 2$ and $y \geq 3$. Candidates found it difficult to identify the third inequality $x + y \leq 9$ or muddled the inequality values for *x* and *y* ie $x \geq 3$ and $y \geq 2$

Many candidates could not give the inequality signs correctly. For those that failed to score at all, the most common incorrect answer seen was just a list of coordinates with a complete failure to engage with the concept of boundary lines. A significant minority wrote the equations for each of the three lines (gaining 1 mark if this was completely correct) but without engaging with the idea of a region bounded by inequalities. When correct, most students has $y \leq -x + 9$, suggesting a that they were using y=mx+c method. It was not unusual to see $y \leq x + 9$, suggesting the negative gradient had not been spotted.

Question 10

Generally, this question was answered well. Many candidates started the problem using Pythagoras theorem to find AC $\left(= \sqrt{12^2 + 16^2}\right)$. These candidates worked out the length of AC to be 20 gaining the first two marks. However, the student who read the question carefully realised that Pythagoras theorem could be used again to find the value of *BD*. Many candidates found the length of *AD* by multiplying 20 by 1.5 and then went on to write down $\sqrt{30^2 - 16^2}$ to obtain 25.4 gaining the next two marks. Others made the mistake of treating *ACD* as a right-angled triangle. Some candidates lost the final mark as they did not subtract 12 from 25.4 to find the length of *CD*.

Some candidates used trigonometry to find the value of *CD* which was an acceptable method by working out angle *BCA* and/or angle *BAC* and proceeded to work out *CD* using trigonometry. Many candidates made rounding errors thus losing the final mark due to lack of accuracy as their answer did not round to 13.4

Question 11

This question was answered well by the majority of candidates. Many candidates could work out $\frac{5}{9}$ and then proceed to find the value of 36. Some candidates used an algebraic approach to find the value of 81 or 36. A significant minority simply found $\frac{4}{9}$ of 45 and gained no credit. It was rare to see bar models used, but where they were this proved successful.

Some candidates left their final answer as 81 thus losing the final mark.

Question 12

Many candidates gained full marks for a fully correct expansion and simplification. A small number of candidates gained no marks as they multiplied two factors and then a different two factors and then tried to simplify from there. An example being $3x \times (2x + 5)$ added to $3x \times (7x - 4)$. Of those that did gain the correct answer, some then attempted to factorise. If done correctly, 3 marks were still awarded as per the mark scheme. If done incorrectly e.g. dividing by 3, only 2 marks were awarded.

Question 13

(a) In many cases, the cumulative frequency table was completed accurately by the majority with very few errors seen.

(b) The majority of the candidates drew the correct graph. A small number drew a line of best fit rather than joining the points. A small minority drew an incorrect cumulative frequency graph, usually using interval midpoints, or a histogram or a bar chart using the cumulative frequencies or the frequencies.

(c) Most candidates were able to gain the mark for the median. A significant minority swapped the axes, finding the cumulative frequency associated with 30 minutes.

(d) Some candidates struggled to interpret what reading they had to take, and some managed to take a correct reading but then failed to subtract their cumulative frequency from 60 and then write their answer as a decimal thus losing the final mark.

Question 14

Both parts of the question were answered well.

Question 15

This question proved challenging for many candidates in this cohort although one mark could be gained by writing one from 125 or a^{12} or c^6 in a product. Some were able to recognise that reciprocating or cubing or simplifying was needed and managed to gain 1 or 2 marks if they did not gain the correct answer. It was disappointing to see that many candidates left a number term and an a term or a c term in both numerator and denominator, not recognising that cancelling was required for simplification.

Question 16

Marks on this question were well spread, but most candidates were able to start by removing the denominator and expanding the left-hand side correctly thus gaining the first mark. Some candidates made simple errors, such as losing signs or missing out brackets or expanding $c(3 - 8t^2)$ incorrectly to $3c - 8t^2$. The candidates still could access the second and third method marks as a special case.

Some candidates were then unable to gather the t^2 terms correctly on one side of the expression. Those who did gather the t^2 terms correctly usually found an acceptable expression for t^2 with relatively few continuing with incorrect cancellation. Some candidates, for the final mark, did not realise that they had to square root their final expression of t^2.

Question 17

(a) This part was generally answered well with most gaining 2 marks; some gained 1 mark for 2 correct terms, with $2x$ given as x rather than 2

(b) Many candidates appreciated the need to equate their answer to zero in part (b), although some moved straight towards solving an equation without stating it first. These candidates tended to use factorising or the quadratic formula to good effect to find two x values although too many lost marks by failing to show sufficient algebraic working. Some failed to find any y values and others put both x values on the answer line. A few candidates went back to the equation of the curve and tried to solve for $y = 0$. Some students tried to solve the original cubic given equated to zero.

Question 18

Many candidates scored full marks here with an excellent appreciation of the steps needed to convert recurring decimals to fractions. The common method seen was working with $1000x$ and x. Most candidates scored both marks with this method, but a few did not give the intermediate fraction $\frac{702}{999}$ or omitted the conclusion of $\frac{26}{37}$ and thus losing the final mark.
Other candidates did not subtract two recurring decimals that would result in a terminating decimal or whole number. Some candidates lost marks because they did not demonstrate an appreciation of the recurring pattern - if they did not use dots or lines to demonstrate the recurring part of the numbers, we needed to see values given to at least 6 sf, which some candidates did not do. A common error was to treat the given number as 0.7022727….ignoring the digit of 0

Candidates who were not confident on this topic, generally tried to use their calculators to demonstrate that the fraction and the recurring decimal were the same. This scored no marks as the question clearly asked candidates to use an algebraic approach.

Question 19

Many candidates were able to gain 2 marks for this question but writing the inequality correctly at the end sometimes seemed beyond them. Candidates were told to show clear algebraic working and most showed a factorisation or correctly used the quadratic formula. Some candidates worked backwards from their calculator and gave the factorisation as $(x + 2.5)(x - 1.5)$ which is incorrect and does not expand to give the given function. Using a calculator to find the roots will not be credited.

Candidates then needed to express the solution set correctly as lying between the 2 roots not including the roots. Those who drew sketches had a better chance of writing down the correct final inequalities.

Question 20

(a) Most candidates managed to score the full 3 marks for a fully correct Venn diagram. Others just placed all the numbers from the question in the associated area without taking account of other numbers in that set.

(b) Quite a lot of candidates managed to score the marks for this part of the question either from a correct diagram or follow through marks. Some only listed 10 and 6.

(c) This part could be answered either from the diagram or from a follow through, but many missed the conditional part of the question and had denominators of 120.

Question 21

Many candidates could set up an equation for the volume of the cuboid ie 1014 = $6x^2y$. Generally, candidates could find an expression for the surface area of the cuboid but made fundamental errors such as assuming that four sides of the cuboid had equal areas thus losing the second mark.

Showing the proof of the surface area was challenging to some candidates, however, credit must be given to candidates who used annotative methods to show that $A = 12x^2 + \frac{1690}{x}$ as clear algebraic methods were shown.

Question 22

Combining the area of compound shapes with error bounds confused many candidates. It was common to see them concentrating on the area of the rectangles, using the given values, and then attempting to give an upper bound or a lower bound for their answer.

Bounds for significant figures were well done, but many students made an error in finding the bounds for 11.5 with 11.45 and 11.55 common incorrect bounds.

Candidates should be encouraged when answering these questions to list the appropriate upper and lower bounds before starting to solve the problem. This will usually enable then to gain the first B mark even if they can progress no further. Many candidates gained one mark for correctly identifying a correct value for a bound. Those candidates who understood what was required often failed to find the suitable degree of accuracy required ie 90. A common error was to find the upper and lower bounds and then find the average of the two values leading to an incorrect final answer.

Those that were able to work with limits often failed to understand which bounds to use in the calculation to give the upper bound or the lower bound ie they worked out $11.75 \times 9.25 - 4.15^2$ or
$11.25 \times 9.15 - 4.05^2$. some candidates could gain 3 marks for substituting their values of bounds between the ranges given.

Question 23

Some candidates were able to score the first mark for factorising at least 2 of the quadratics correctly and then gaining the second mark by factorising all of the quadratics correctly. Some candidates simply gained a mark for inverting the second fraction.

Some candidates could not factorise $4x^2 - 4x - 120$ and $5x^2 - 180$ fully leaving their answers as
$(4x - 24)(x + 5)$ or $(5x - 30)(x + 6)$ respectively. They could not progress any further as they could not cancel down the expressions. Many students lost the 4 in the first fraction factorising it as $(x - 6)(x + 5)$ carrying the result through to get the answer 2.

Those that did not start the whole process by factorising tended to get themselves in a real muddle with complex expressions that invariably went wrong.

Substitution of values of x into the given equation was not an acceptable algebraic method thus scoring no marks.

Question 24

This was a very challenging question for the candidates. Many of the responses were blank at expected as this level. Some of the remaining candidates scored one mark and the most able scored full marks.

There were many approaches to the value of n. Candidates made it difficult for themselves by using x when a well-chosen number would do just fine.The mark scheme listed the most common methods used by the candidates. The main hurdle to the question was not a specific value was given for eg the length of AB. Candidates could use any value as their starting point to find the value of n. Candidates tended to let AB = 1 and some candidates could find an expression for EQ, for eg, $\frac{0.5}{\cos 80}$ and then evaluating to find 2.87. Candidates did not realise the use of Pythagoras theorem in the question was the most efficient way to find the value of n. Many candidates did not use Pythagoras theorem correctly or did not realise it was applicable. A significant number of students assumed that EQ = EA and thus restricted themselves to 1 mark.

Those who used an algebraic approach often struggled beyond a correct expression for EA, though they gained 3 marks for progressing this far.

Candidates should try to draw diagrams to fully interpret the question.

Question 25

(a) This question was poorly attempted. Most candidates could not factorise by taking out -6 at the beginning before completing the square and the manipulation of algebra was also very poor. Some candidates who initially factorised correctly lost marks later due to missing brackets when attempting to complete the square. Only a minority of candidates gained full marks here.

(b) Many candidates found this part of the question challenging as they could not sketch a quadratic graph. If they could it was generally a ∪ shaped which gained one mark.

Question 26

Questions at the latter stages of the paper are graded at level 9 and are designed to be challenging. This was another question that the candidates found challenging with many candidates failing to realise that they had to find the linear/ volume scale factors. Candidates could work out the scale factor, for eg, $\frac{5}{3}$. Many candidates tried to set up the initial equation but were hampered by the fact that they did not know how to proceed from working out the linear scale factor. Candidates who had not read the question carefully worked out the volume of B by giving answer of 202.5 and forgetting to add 735 to it to find the volume of A.

Only a minority of candidates gained full marks here.

Summary

Based on their performance in this paper, candidates should:

- be able use formula given on formula sheet correctly
- be able to apply differentiation to a problem
- be able to read graph scales accurately
- assign angles correctly to diagrams
- read the question carefully and review their answer(s) to ensure that the question set is the one that has been answered and their answer(s) represent a reasonable size
- make sure that their working is to a sufficient degree of accuracy that does not affect the required accuracy of the final answer.
- make their writing legible and their reasoning easy to follow
- candidates must, when asked, show their working or risk gaining no marks despite correct answers

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