Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

November 2024

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

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PE report on 4MA1 paper 2H November 2024

Overall we saw some good attempts at most questions. The harder higher graded questions at the end of the paper were left blank by some, but it was pleasing to see others make an attempt and pick up some marks by showing a good method; full marks were gained by the proportion we would expect.

On the whole working was easy to follow, but in some cases, we would stress to students to show their working clearly and logically and to cross out any unwanted work.

Students should read questions very carefully and ensure they are giving the answer that is required, eg on Question 5, some students stopped once they got to the probability 0.24 rather than multiplying this probability by 400 to get an estimate for the number of times the spinner will land on 4

It was evident that some students were very adept at using their calculator but there was evidence of some working in gradians rather than degrees for trigonometry questions. Premature rounding cost some students the final accuracy mark and students should be persuaded to use a good number of decimal places or store numbers in their calculator memory, especially for long questions drawing on, for instance, a few different figures for the final answer.

We saw many cases of students misreading the numbers in the question but more worryingly, misreading their own writing, eg 102 for 120 and 180 for 108. Students must write clearly so they can see what they have written and ensure by checking that they have used the correct values.

This paper had a good range of difficulty and attempts were made for most questions. There were fewer attempts on the harder questions later in the paper. Some students are again not showing their working clearly, especially for the questions which say "Show clear algebraic working". It is a shame to see students losing marks for not showing their work clearly or missing some steps in their workings. You can notice more reliance on scientific calculators.

Report on individual questions

Question 1

On our papers we necessarily must test students working without the use of a calculator and this fraction multiplication question was very typical. Many students gained full marks.

Those that didn't gain full marks were often able to gain a method mark for writing the 2 fractions on the left as correct improper fractions. However the working often then went

straight to 15/4 which seems to come from use of a calculator as this did not show the intermediate step of 420/112 and no intermediate cancelling was shown by students.
If cancelling to 3/1 × 5/4 was shown this then led nicely to 15/4 and then to the given answer.

It was surprising to see some students come up with the correct answer from wrong improper fractions; students should realise that if they are not getting the given answer then they must re-check their working.

Question 2

Very well done with 1.45 and 1.35 generally given as the correct upper bound and correct lower bound for 1.4.
A minority of students clearly had no understanding of what was meant by bounds, either leaving the page blank or writing down irrelevant working such as 1.4 × 2 = 2.8 and 1.4 ÷ 2 = 0.7, or answers such as 28.
The most common incorrect attempts at bounds were 1.44, 1.4 + 0.5 = 1.9, 1.4 – 0.5 = 0.9, 1.5 and 1.3

Question 3

This trigonometry question was extremely well done by higher level students and most used cosine as we would have expected. Some students chose a long way round, using sine and then Pythagoras and also we did see frequent use of the sine rule.
Some students found the length of the opposite side. Some lost accuracy by using a method with two stages or by rounding incorrectly without showing working.

Question 4

(a) Most students were able to find the number of which 357 was 17% of , using a direct method of 357 ÷ 0.17 However the common incorrect method and answer was from finding 17% of 357, also multiplying or dividing by 0.83 or 1.17
(b) Many students gained full marks for this percentage interest question. A few were only able to gain 1 mark for finding the increase. Others gave an answer of 124% or 0.24% and gained M2. The most common error was dividing the difference by 806 instead of the original value, 650.

Question 5

This question was done well at Higher level and many students gained full marks. Others forgot to take the probabilities from 1 to get the total probability for landing on 1 or 4 and some stopped at 0.24 and appeared to think they had finished the question. Some students arrived at an answer of 192 as they didn't halve the probability.

Question 6

Quite a lot of full marks were gained on this question, but it is surprising that so many students struggled with surface area. Issues that made students lose marks were, finding the volume rather than the surface area, not dividing by 2 for the area of a triangle, forgetting the slant face, forgetting one of the triangular ends and just multiplying together all the given figures.

More confusion than one might expect on a relatively straightforward question. π was seen quite often and even things like $\frac{\theta}{360} \times 2\pi rl$ and $\frac{\theta}{360} \times \pi^2$. Even Pythagoras' theorem appeared from time to time, giving the value of 10 cm for the hypotenuse of the triangle which was clearly shown on the diagram.

Question 7

This question was very well attempted by Higher level students with many cases of full marks. Mistakes were seen where students got $x = 3$ and $y = 3$ mixed up and also $y = 1$ and $x = 1$. Sometimes an attempt at the line $x + y = 7$ was shown by the lines $x = 7$ and $y = 7$ or by a single line with a positive gradient. If students got a vertical line, a horizontal line and a diagonal line with a negative gradient, they were often able to gain the mark for shading the region; sometimes this was a follow through mark from inaccurately drawn lines.

The line $x + y = 7$ caused more problems than anticipated. A noticeable number of students correctly started a line for $x + y = 7$ at 7 on either axis, but then connected their line to 8 on the other axis. This was a shame to see when it might simply be down to using a ruler inaccurately. Very few students used any visible strategies to help themselves: table of values or substituting zero to an equation. It is a shame, that some students do not see these strategies as a possible help in plotting any lines.

Students should be encouraged to label their lines clearly to avoid any ambiguity and also to make sure that their area is clearly indicated.

Question 8

This question was well done with many gaining full marks.

Incorrect attempts often showed us that 145 ÷ 4 = 36.25 and 142 ÷ 5 = 28.4 and then they did various things with the 36.25 and 28.4 such as subtracting or adding or even adding and dividing by 2 A few just subtracted 145 – 142

A number of candidates misread the question as the total of the weight of the 4 bananas as 145g.

Some students gave the correct answer of 130 and then divided by 5 so losing the last mark.

Question 9

There are not many exam series go by without a question on compound interest or depreciation and this session was no exception. This question was a good source of 3 marks for many, but there were still students who used a simple interest method and gained just 1 mark for 3.5% of 20 000. A few students used depreciation and they were generally able to pick up 1 mark as a special case.

For those gaining 0 marks, the biggest reason for this was the use of 0.35 instead of 0.035. Some candidates struggled to convert the percentage into a correct decimal.

Both the direct method and the step by step method were used but the latter was more prone to inaccuracy. Some cubed 0.035 instead of 1.035

Question 10

There were a fair amount of fully correct answers scoring 5 marks.

Working on the whole was set out very clearly and was easy to follow, with calculations labelled and explained.

3 marks was a common mark for those students who were able to deal with the students in year 11 and realised the best way to solve this problem was to find an equation and solve it and then substitute the value for x into the year 11 Biology expression.

The Pie chart generally was the part that higher students found difficult to work with.

Many divided the angle by 300 rather than 360 to find the proportion for each subject and a fair number did not attempt this part.

It would be wise for students to consider the meaning of a decimal or negative value for the number of students.

The problem solving aspect of relating the two parts of the question seemed to trouble some students. Some mistakes were made by those who calculated the number of students for all

subjects and then chose the wrong ones to subtract.
For the Year 10 pie chart, a lot of students mistakenly thought that the number for the size of the angle represented the number of students. Others also mistakenly connected the two year groups, believing that $126 = 3x + 6$

Question 11

This question needing knowledge of angles in a polygon was a good source of marks for many. There were also plenty who found it difficult.

Common mistakes involved getting interior angles and exterior angles mixed up.

Showing correct angles on the diagram was a very helpful way for students to show their understanding and we would encourage this method of working.

Many students were able to pick up the first 3 marks for getting to angle $AEF = 132^{o}$; they then failed to make further progress because they did not 'see' that triangle *AEF* was isosceles.

Question 12

(a) Several students were able to gain the correct answer for this question, but others struggled with a sign error when multiplying out the 2nd fraction or forgot to multiply the x on the RHS by their common denominator when dealing with the full equation.

Some lost x on the right hand side and treated it as 0.
When teaching this question it is important to point out that c appears twice and that as a result factorisation at some point will be necessary.
A number of students multiplied the numerator of each fraction by its own denominator.
A number of errors in dealing with adding and subtracting negatives.

(b) A very typical changing the subject of the formula question which caused many students little problem. Mistakes that were made involved sign errors and also careless mistakes with squared terms and generally misreading of a students own writing.
Students who did not gain full marks very often gained at least one; the majority of students knew to begin by squaring both sides and could gain a correct expression for f^2.

Question 13

Many students scored a good number of the 6 marks available for this question. Some students still get mixed up with plotting, using mid-interval or lower-interval values rather than upper-end intervals. Also, rather than finding the median from the graph, some students just state 30 which is the place at which they should read across from the vertical axis to find the median, or instead gave an answer of 3 which is the halfway point of the x-axis We also saw a few bar charts appearing.

Some students read off values such as the lower quartile value rather than the median and for the number of parcels weighing more than 3.7 kg, some gave the number below this weight. Those that did this, however, often still gained M1 for showing the process of taking their reading from their graph. There were a few responses that did not use their graph to find an answer to part d, gaining 0 marks.

Question 14

Several students were able to show a fully correct method and answer for this indices question. It was a shame to see some obtain a fully correct equation and then make a mistake such as getting to $2n - 1 = 4 - 2n$ and then writing $4n = 3$ or a similar mistake. Some struggled to start and some were only able to gain 1 mark for using a rule of indices correctly but not continuing their work correctly. Others were incorrectly multiplying the powers instead of adding. $\frac{2n+3}{4}$ on the left was not uncommon, nor were powers of 9, 27 and even 81.

Question 15

We saw many examples of good working that was able to use algebra to show clearly that the given recurring decimal was equal to the fraction. However, we saw attempts that suggested students knew they had to find $100x$ or $10x$ etc but that they had no understanding of what was needed to proceed to the given answer. Some attempts did not use algebra, where there was a clear instruction to do this, and the maximum mark they could gain was 1.

Others who scored M1 often did not show the fraction 756/990 oe. Others who scored zero failed to identify that you needed x and $100x$ or $10x$ and $1000x$ and used incorrect combinations to subtract.

Question 16

Most students were able to correctly find angle AOD and give the reason for this. We did see some reasons such as ‘ it is double 54’ or ‘kite theorem’ which did not explain that the angle at the centre is double the angle at the circumference; inadequate statements must be avoided and the underlined words in the mark scheme learnt.

For part (b), some students incorrectly thought that angle *ACO* was equal to angle *CDB*; but there were many correct answers. Part (c) was a good discriminator and while frequently correct showed misconceptions such as assuming that there were 90 degree angles present; some students added both angles originally marked in the diagram and took them away from 180, demonstrating lack of understanding of cycle quadrilateral circle theorem.

Students do not seem to worry about giving obtuse or reflex angles for angles that are clearly acute.

Question 17

Many students found this difficult, often not knowing where to start.
Several students added the two given vectors and then stopped or thought they had completed the question as they often wrote this vector on the answer line.
Some students reversed the x and y elements for one of the vectors before adding or subtracting them.
Some gained the correct vector for *HF* and gained 1 mark, but could go no further. A small number correctly used Pythagoras and gained the correct answer of 15

Question 18

This question was set at a high level and so bearing this in mind, it was generally done well. Students who failed to gain marks or who only gained 1 mark were those who did not show an understanding of the need to rearrange the given equation to find the gradient and then use this gradient to find the gradient of the perpendicular straight line.
Most scored full marks or M2. There was some confusion on how to find the perpendicular gradient and some students used $m = 2$ or $m = –2$. Some of those who scored M3 unfortunately rearranged incorrectly.

Question 19

Students find transformation of graphs question difficult and this question was no exception; some students had clearly studied this topic very well and were able to gain 2 or 3 marks out of 3. Others had little idea and made guesses often based on the number in the function transformation.
For part (a) we saw incorrect coordinates of (5, 9) and (10, 9) amongst others.
For part (b) we saw incorrect coordinates of (15, 4) and (15, 12) and other spurious ones.

For part (c) we saw, for example, (-2, 4) and (-2, -3).

Question 20

Many students were able to gain 2 marks for this question but writing the inequality correctly at the end sometimes seemed beyond them. Some students worked backwards from their calculator and gave the factorisation as $(x + 2.1)(x - 1)$ which is incorrect and does not expand to give the given function. These students gained no marks as clear algebraic working was requested.

Those who drew sketches had a better chance of writing down the correct final inequalities.

Question 21

We saw many good responses to this with full marks being gained by several students. 2 was also quite a common mark where students could identify the first part of set notation and correctly solve the equation but could not identify the parts of the Venn diagram needed for the 2nd part of set notation. Some students formed an equation but it was incorrect because of their understanding of the notation used. It was a shame when we saw a perfectly correct equation, for it to be solved incorrectly.

In some cases, students were able to pick up 1 mark by substituting their value of x into the correct expression from the Venn Diagram.

$3x + 2 = 26$ was one of the more common mistakes in finding x.

The final area often included the regions $4x$ and $3x + 2$

It was disappointing that students still "take a guess" when dealing with Venn Diagram questions like this. Very few used some kind of strategy (such as shading) to help them to determine the correct parts of the diagram.

Question 22

This question is always a good source of marks for students who have understood and revised simultaneous equations where one equation is quadratic and one linear. We saw some very good performances on this question and also some students who didn't know where to start and, in some cases, who thought they could solve by elimination by taking the linear equation of $x + 2 = y$ and 'square' it to give $x^2 + 4 = y^2$. Those who could get to the correct quadratic equation after combining the two given equations and then could factorise were often the ones to go on and gain full marks. An issue that was seen regularly when using the quadratic formula was to write 2 as the denominator and not 2 × the value of a

Quite a lot of algebraic mistakes in the simplification which could be avoided with more care. Some treated the 3 on the right as 0 when they attempted to solve their quadratic equation.

Question 23

This question was one that needed students to start by factorising and cancelling out common factors. Those that did not do this often found themselves with very long quartic expressions and they rarely got every term correct so it was difficult to get anywhere near the correct answer. Those who factorised soon realised that some terms could be cancelled and everything became easier. It was a shame when we saw a student get all the way to
$8x – 12 – (7 + 8x)$ and show their next line as $8x – 12 – 7 + 8x$ and then they found n to be $16x – 19$ rather than the required $–19$
Pupils should be encouraged to factorise quadratics whenever they see them in an algebraic fractions question. Even if they have no idea what to do next they can gain 2 marks on this very difficult question.
$16x^2 – 36$ was frequently factorised to $(2x - 3)(2x + 3)$, losing a factor of 4, and sometimes to $2(2x - 3)(2x + 3)$.
Students often failed to notice that $(2x + 3)$ divided into $(4x + 6)$.
Some students picked, or more often 'derived', a value of x which they then substituted into the original expression to get n = –19. This is not a correct approach.

Question 24

This question was set at the highest level for the paper and had no scaffolding in the form of a diagram. Students who were best placed to do well generally drew an annotated diagram and the mention of 118 degrees shown on this for angle *ABC* gained them the first method mark.
A few used a scale diagram which rarely gained marks but if fully accurate was awarded full marks (278 was a common answer). We did see some very pleasing performances on this question from those that this question was specifically aimed at; 5 marks were often awarded, when they could not gain the final bearing or 6 marks was seen an expected number of times.

Question 25

A very challenging question where a variety of approaches could be used to solve the problem.

Many made no attempt or just wrote formulae. A common mistake was assuming the length of the side of the triangle was x or $2x$. Those who could calculate the area of the small triangle sometimes made errors by not dividing by 2.

No angles were given so many students did not consider using trigonometry. Instead, they tended to make unjustified assumptions, such as treating the side length of the triangle as $2x$. Some students also thought that they could (and should) work out the value of x. Problems occurred when students added-in additional variables rather than relating expressions to x. Once students were able to express the base in terms of x, they usually went on to score full marks.

The main approach (and generally the one that successful students used) was to utilise the ½ $ab\sin C$ formula with $C = 60°$ and $a = b =$ length of AB.

Based on their performance on this paper, students should

- Learn formulae and how to use them correctly
- Read questions carefully and ensure they are answering what is required
- Write legibly so they can understand their own handwriting
- Ensure they do not prematurely round their answers
- Aim to show all working in a clear and logical order, especially for show that questions, and show multiple steps.
- How to break down multi-step problems – some students could have scored some marks if they tried to attempt the problem-solving questions.
- Improve algebra skills such as rearranging equations and solving algebraic fractions.
- Limit the time that you spend on any one question.
- Learn standard entry points into questions such as factorising any quadratics that they see.
- Think carefully about the reasonableness of their answer e.g. a length or weight cannot be a negative value
- Check the answer has been given in the form required.

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