Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

Summer 2025

Pearson Edexcel GCSE (9 – 1)
In Mathematics (1MA1)
Higher (Non-Calculator) Paper 2H

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GCSE Mathematics 1MA1
Principal Examiner Feedback – Higher Paper 2

Introduction

It continues to be the case that learners tier of entry appears to be appropriate, as we saw many learners attempting most, if not all, questions. The paper differentiated well, allowing all learners to have some success whilst also providing challenge where appropriate.

Learners were well prepared for many topics, such as lowest common multiple (Q1), ratio (Q2), standard trigonometry (Q7), linear equations (Q10), probability trees (Q11) and box plots (Q12). Early problem questions involving area and coverage (Q3) and mean and ratio (Q6) were answered well by many. In many cases little progress was made with the similar shapes problem (Q16) and likewise the perpendicular line problem (Q20). Leaners would continue to benefit from opportunities to verbally articulate their mathematics to support their responses on reasoning questions.

Presentation of work was generally good, with many responses showing clear annotation, especially within problem questions, although some working was very messy. Whilst in itself this is not an issue, it can lead to learners miscopying their own work or figures and losing marks.

Report on Individual Questions

Question 1

Question 1 was assessing prime factor decomposition in part (a) and lowest common multiple in (b), allowed most learners to have a positive start to the paper and gain some early success.
In (a) those using factor trees sometimes made arithmetic errors but did normally continue to prime numbers at the end of branches. This meant that they were able to gain 1 mark. There were cases of responses writing the prime factors as a list with commas, instead of as a product, and these did not gain the second mark. Those who used full stops for multiplication were able to gain full marks.
Part (b) was also answered well with the majority gaining at least one mark for finding all the prime factors of both 30 and 25. The less successful responses then went on to find the highest common factor and lost the second mark. We did commonly see a method this year not previously seen much, showing a grid, and dividing both numbers by primes until the remainders are co-prime, in this case this led to the values of 5, 5 and 6, which can then be multiplied to find the LCM.

Question 2

Question 2 required learners to divide an amount in a 3-part ratio. This question was answered very well by most learners with the full 3 marks commonly being awarded. Less successful responses had made arithmetic errors when dividing or multiplying but were often awarded 1 or 2 marks.

Due to the nature of the values in the ratio (2 : 3 : 5) some responses recognised that 2 parts were equivalent to $\frac{2}{10}$ or $\frac{1}{5}$ of the whole and started by dividing by 5, or similarly with 5 parts being equivalent $\frac{1}{2}$ and dividing by 2. These responses were able to gain full marks. However, this is very similar to a common misconception where learners divide the total by each of the numbers in the ratio (2, 3 and 5), and this led to an incorrect answer. If this was the case, no marks were awarded. We also saw some responses working with 69 rather than 690. If full working was shown, this could be awarded the method marks.

Question 3

Part (a) gave learners their first opportunity to tackle a problem, and most were able to gain some good credit. The first two marks were for finding the shaded area, with 1 being awarded for a correct partial area. In many cases at least 1 of these marks were awarded. We saw mistakes in both the calculation for the circle, often using $r \times \pi^2$ or finding the circumference. A significant number of responses with the wrong radius, such as 4.5, with no working to gain that value shown. For the triangle we saw the common error of forgetting to half. The third mark was for dividing an area by the coverage of one bag of gravel. We awarded this mark even if the area was incorrect, so those who made mistakes and perhaps only gained 1, or even none, of the first 2 marks were able to gain some credit for this process. The final mark was an accuracy mark, so we needed to see the correct rounded value of 6 coming from correct and accurate calculations.
Part (b) was the first reasoning question on the paper and was looking for leaners to realise that a lower coverage per bag meant that more bags would be needed. Many responses did gain this mark which was pleasing to see. In some cases, if the answer in part (a) was incorrect, the decrease in coverage didn't affect the number of bags. If that was the case and responses correctly identified that and supported this with a calculation, they were still able to gain credit.

Question 4

Another reasoning question and one many learners found harder than 3(b). The question showed a response to a loci question where someone was asked to shade the region at least 2 cm from a fixed point. The response was incorrect as, even though they had drawn a circle, they had shaded inside rather than outside of the circle. Many struggled to articulate a correct response. We saw a lot of responses referring to a square or that the diagonals were not correct. That said, we saw many good replies with learners realising they should have shaded outside, or that they had shaded where *P* could not be, rather than where it could be.

Question 5

This was a 'reverse percentage' style question, but with the change being given as a fraction, in this case $\frac{1}{5}$. The first mark here was for realising that the given amount was after a decrease of

$\frac{1}{5}$ and was therefore $\frac{4}{5}$ of the original amount. Learners could achieve this simply by stating it, by forming a suitable equation with the original amount as an unknown, or by dividing by 4 as a first step. Less successful responses started by dividing by 5, this was then normally added to 8000 to give the common incorrect answer of 9600. This response gained no credit.
Those who understood the question often gained all 3 marks, and it was typically only arithmetic errors that stopped that from happening.
This reverse fraction, or the more common reverse percentage style question is definitely an area for improvement.

Question 6

This problem involving mean and ratio was worth 5 marks. Learners were given 2 lists, **A** and **B**, of numbers, one of which contained an unknown value. They were also told the ratio between the mean of each list and asked to find the unknown value.
The most straightforward way through the problem was to start with list **A** and find its mean. From there learners could use the ratio to find the mean of list **B**. This would have earned the first 3 process marks. The fourth was for then working with the mean of list **B** and the actual values with an accuracy mark for finding the correct missing value.
An alternative route that was seen a number of times, was to write an algebraic expression for the mean of list **B** and use this to form an equation to solve. However, when working with List **B**, many did not appear to count '*x*' as a value and divided by 5 instead of 6.
In all cases the second, third and fourth process marks could be awarded even if the first wasn't. This was for the learner who made an error calculating the mean of list **A**, but who then used the ratio correctly. Likewise, it allowed credit to be given to the learner who made an error forming an expression for the mean of list **B**.
It was pleasing to see that, although a multi-step problem, most were able to gain at least 1 or 2 marks on this question, with many going on to score full marks.

Question 7

A straightforward trigonometry question to find an unknown angle, and one where many gained both marks. The efficient method was to use tan, but that wasn't the only method seen. There were several learners that used Pythagoras' Theorem as first step and then either sin or cos. Both methods were acceptable, but the method mark was only awarded when they got as far as an equation where the missing angle was the only unknown.
Whilst correct, and perfectly acceptable, these alternatives, are far less efficient, and often led to arithmetic errors, or accuracy errors due to premature rounding. Learners should be encouraged to use the most efficient method where possible and reminded not to round until a final answer is obtained. There were some who identified tan as the correct ratio to use but made the mistake of writing the numbers the wrong way round.

Question 8

This problem required learners to work with density and unit conversions and as such these two processes provided the basis for the process marks.

These marks could be awarded in either order as the two steps could be done in either order. The most common approach was to first use the density formula to find the mass of one of the steel rods. Those who attempted this did normally get this step correct, which is pleasing with density being a formula not given in the question. Some used this formula incorrectly but were still able to gain a mark if they completed a correct conversion.
Those who followed this most common approach then needed to either convert the mass of a single rod to kilograms or the maximum load of the trolley to grams. Again, it was common to see this conversion being carried out correctly. However, we did see some using a conversion factor of 100 rather than 1000. Those who started with a conversion of the 300kg quite often gained this mark but then didn't use of the density formula correctly, and so only gained 1 mark. It was also seen that learners used density correctly but then didn't realise that the two masses were in different units and hence divided the wrong way round, again this response would only gain 1 mark.

Question 9

This question involved an expansion of a bracket but with the inclusion of a negative index, and there were few fully successful responses to this question. Many struggled when multiplying $3x^{-1}$ by $4x$ often getting to $12x$ rather than just 12. The other common cause of 1 mark rather than two was when leaners found the correct expression but then contradicted this on the answer line by stating $b=3$ rather than $b=-3$.

Question 10

A linear equation to solve for question 10, but slightly complicated for some by the fraction on the left-hand side. However, performance was good here with a majority of responses gaining both marks. The main thing to note is that an intention to multiply by 3 was not enough to gain the M mark. Learners had to either write the multiplication within the equation, such as $\frac{14-x}{3}\times 3=3x\times 3$, or they had to get as far as $14-x=kx$ where $k>3$.
Less successful responses often started by trying to add x to both sides, totally misunderstanding that it should be $\frac{x}{3}$ that needed adding. This misconception with fractions was common and is an area for improvement. It was also quite common to see the left-hand side multiplied incorrectly leading to $42-x$.
Another error seen after giving it as $14 - x = 3x \times 3$ was to then add x to both sides, and giving it incorrectly as $14 = 4x \times 3,$ which led to a final incorrect answer 14/12
Some responses removed the fraction successfully but reversed their division, gaining only the method mark as a result. Most responses that gained success in answering this question wrote the answer as a decimal.

Question 11

This probability tree question is very familiar to learners and as such many answered it well. Less successful responses in part (a) still typically gained 1 mark for 2 correct values but commonly had the last two values incorrect.

Part (b) required learners to decide which branches of the tree were appropriate, calculate the correct products and add to find the correct probability. Most were able to gain at least 1 mark for a single correct product. Stronger responses found the correct 2 products and added to an answer of 0.29 or 29%. Unfortunately, some responses found the correct probability but then subtracted this from 1. This negated the ‘complete method’ for the 2nd mark, and this response would only score 1.
It is also worth noting that all 3 marks in part (b) can be followed through from an incorrect probability tree in part (a) providing the answers were still less than 1.

Question 12

Part (a) of question 12 received excellent responses from numerous learners. It was common to award full marks, more so than recent years. This is probably because all of the needed values were explicitly stated in the given table, rather than one or two needing.
Part (b) was different however and indicated that many learners do not fully understand that each section of the box plot represents 25% of the data, and for this question that width of the box, represents 50% of the data. Extra work on this understanding would benefit many.
The final part of the question was another reasoning response and was really a differentiator between more and less successful responses. Stronger responses showed an understanding that there was an even number of people in the sample, and this meant that the median didn’t have to be an explicit value in the data set, but that it was the mean of the middle two values. There were some excellently articulated responses seen. It was not enough to simply state that we did not know the exact values.
Some responses recognised the median is the middle value, but left their answers there, resulting in it being too vague to score the mark.

Question 13

A now familiar question expanding the product of 3 linear terms, and one where we almost always saw responses gaining some credit. Where responses gained 2 instead of 3 marks it was typically because they had made a single multiplicative error at some point, often relating to negative numbers, and carried that through.
We saw some responses expanding the first product, perhaps with a single error and gaining the first method mark. Sometimes these responses then simplified the two terms in x incorrectly, but then expanding the third bracket correctly. These responses were able to gain the second mark also. Many of the responses that did not gain full marks may well have done if the learner had gone back and checked their work carefully.
On a similar note, some learners did all the expansions correctly but failed to check their final answer, and we saw several with missing powers, meaning the C mark was withheld.
A misread of the negative in the bracket $(x-1)$ to $(x+1)$ simplified the question and was therefore unable to score.

Question 14

The product rule for counting is a topic that always splits the cohort, and this year was no exception. Here leaners had to find the combinations for the prizes for dogs, and the combination of the prizes for cat, and then multiply these two numbers together. Many gained a single mark for either finding the number of combinations for one of the animals, but then often added rather than multiplied, and so only gained 1 mark. We did see some responses that worked with probabilities, and this was allowed for the process marks. Another error that was seen was to divide the products, and in this case, process marks could be awarded if the division was by 2, or 4 or 24 (which is 4 factorial).

Question 15

Identifying a region that satisfies a set of inequalities is another question that provides a good differentiator. Most were able to gain 1 mark, for drawing $y=1$ and $x=2$, although there were still a few learners who got these the wrong way round. To gain any further credit at least one of the diagonal lines needed to be drawn. The one of these drawn correctly most often was $x+y=5$. A common mistake was to draw $x+y=4$ instead of $x+y=5$.To gain full marks the correct region needed to be correctly identified. What made this question different to ones set previously was that one of the lines, $y=3x-2$, was not actually a boundary to the region. This meant that full marks could be awarded in part (a) and in part (b) if this line was missing from the diagram.
In part (b) learners needed to identify which of the lines was not a boundary and could be awarded without full marks in part (a). To gain it from an incorrect diagram they needed to state a line that was not a boundary for their region, which many were able to do successfully.

Question 16

This similar solid question was one learners found challenging. The first mark was for beginning to work with scale factors and was normally awarded for finding the volume scale factor of 15. Unfortunately, many then didn't know how to find the linear scale factor and tried to use the volume scale factor with the lengths.
The strongest responses were able to take the cube root to find the length scale factor and then use this with the given height to find the missing height and an answer of 4.9.
Credit could have been given in the second process mark for equating scale factors, but this was rarely seen. Some premature rounding affected learners' final answers particularly if they worked with 1/15 as the scale factor rather than 15.
Part (b) effectively asked for the exact value of the volume scale factor. Unfortunately, many learners did not understand the real meaning of 'exact value' and gave a rounded decimal. This alone, without a correct expression as a surd or with indices, could not gain the mark.

Question 17

This question, relating to an exponential graph, only carried 2 marks, but proved challenging. The first step, and indeed the first mark, was to substitute the given coordinates into the equation of the graph. This was a mark that was awarded to a pleasing number of responses given the grade of the question. However, only the stronger responses were able to rearrange to find k. This was in part because some did not recognise that $k^{-1}=\frac{1}{k}$. Those who did, normally gained both marks.

Question 18

The use of iterative formulae is definitely an area of development for many. The first mark was for substituting the values for 2019 and 2020 into the formula. This allowed learners to find the constant K. Some gained credit for the substitution but then could not divide to find the constant and went no further. Many of those who did find the value of K were able to then use this correctly to find the values for subsequent years. The most common incorrect approach was to subtract the values and say that the increase was 400 per year. This approach gained no credit at all.
The only other mistake that was seen that stopped full marks was to go on beyond 2022. In this case the comparison could not gain the final mark.

Question 19

This 3D geometry problem was challenging and those learners that gained full marks should be congratulated.
One thing that affected learners and caused them to potentially lose marks was, like with question 7, the use of inefficient methods. It sometimes meant learners carried out 5 or more calculations when only 3 were needed. Again, like with question 7, these approaches, normally with an initial step of Pythagoras, are perfectly acceptable, but give further opportunities for arithmetic or calculative errors, and often premature rounding causing a lack of accuracy.
The question carried 3 process marks, and the first two could be awarded in either order. The first was to use cos to find the length GE. The second was to use tan to find the length of BG. The final process was to combine these two lengths with tan to find the desired angle.

Question 20

This 5-mark problem required learners to work with ratio and coordinates to find point D, then a given gradient to find the equation of line $\mathbf{L}$ and finally use this to find the *y* value of a specific coordinate. The mark scheme basically followed this path. The first mark was for a method to find one of the coordinates of point D using the ratio. The second mark was for a correct form for line $\mathbf{L}$, with the third mark using the coordinate of D to find the *y*-intercept of $\mathbf{L}$.
The final method mark was for substituting the given x value into their equation to find the y value.
Learners were able to gain later marks within the question if they failed to correctly find the coordinates for D, providing it was clear that these incorrect coordinates were what they believed to be those of D. This meant that those who made an error in the ratio but knew how to work with the equation of a line, were able to gain up to 3 marks.
The final mark was for an accurate figure for f, and for stating that this is less than -4
There were some good responses seen, but not many fully correct ones. Many learners knew some of the skills required but struggled to pull them all together.
A commonly seen mistake seen was learners assuming that the 2 lines were perpendicular, learners should be reminded to not assume a 90-degree angle unless given in the question.

Question 21

A quadratic inequality to solve, and one helped by already being factorised. The less successful responses, being unsure normally attempted to expand the brackets first and sometimes follow this with an attempt at using the quadratic formula. This very rarely led to the correct critical values. Those who gained credit normally used the factorised form to find the correct critical values. It was only the strongest responses however, that then used these to write the correct solution as an inequality. Many of those who gained the correct critical values, left them as solutions with an '=' sign, or mixed up the inequality, often giving $x < -\frac{2}{5}$ rather than $x > -\frac{2}{5}$. Another common error was to see the signs mixed up as they removed them from the brackets.

Question 22

This question looked to combine the understanding of the equation of a circle along with a translation of a graph. The strongest responses showed a circle of radius 5 and a centre at $(0, -2)$, showing the two intercepts on the y-axis at 3 and -7. If the drawn circle was not fully correct, 2 marks could be awarded if two of the correct points were indicated on the sketch, or we had a sketch with the correct centre and radius stated. Finally, a single mark could be awarded for a sketch with the correct centre, or no sketch but the correct centre and radius stated. For all the marks, the intersections did not need to be given as coordinates. Performance was mixed, as would be expected on a question of this grade, but it was pleasing to see so many responses gaining at least some marks and having some idea of the nature of the graph and the transformation.

Question 23

The final question was a 5-mark question requiring learners to use the cosine rule to find a diagonal that splits the quadrilateral in half, followed by 2 steps of the sine rule to find the desired angle.
The mark scheme progressed thus: the first 2 marks for correctly using the cosine rule to find BD. Once BD was found, this length, along with those lengths and angles given on the diagram, could be used to find angles ABD and DBC which together make ABC.
Firstly, it was pleasing to see so many learners attempting this question, with much fewer blank responses as we often see on the last question.
Those who knew to find BD, often gained both the first 2 marks for being able to correctly use the cosine rule, although we did see some calculative errors.
Even if it was incorrectly found, a value clearly believed to be BD, could be used in the two sine rule calculations and gain those marks.
The less successful responses made the incorrect assumption that angle ADC was $90°$, and used Pythagoras with the lengths of 6 and 9 to find the length AC. Making this assumption actually led to a length of $\sqrt{117}$ which was exactly the value for BD. However, since this method is incorrect it gained no marks.

Summary

Based on the performance on this paper, learners should:

- Remember not to round prematurely, and only do so once they reach their final answer
- When using trigonometry try to use the most efficient methods to not waste time and lesson opportunities for errors
- Gain more exposure to reverse % calculations including when expressed as a fractional change
- Check work for obvious errors and copy answers carefully within the stages of working, and to the answer line
- Gain an appreciation of the nature of an answer required 'in exact form' ie including surd or index form, and not a rounded value
- Use diagrams and explanation in their method to exemplify their work
- Note the definition of a C (communication mark): it is awarded for a fully correct answer/statement given with no contradiction or ambiguity; a correct answer/statement given with an incorrect statement will be awarded C0, so take care in succinctly writing their correct response to these questions.
- Appreciate the use of a box plot to split data into quartiles
- Recognise the use of a factorised expression for solving equations and inequalities

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