Examiners' Report
Principal Examiner Feedback

Summer 2023

Pearson Edexcel International GCSE
In Mathematics A (4MA1) Paper 1H

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Summer 2023
Publications Code 4MA1_1H_2306_ER

Introduction

The majority of questions were well-attempted by all students in this cohort. Methods were generally shown and apart from the final two questions, it was usual to see marks awarded on all attempts. Below is a detailed review of each question and some key areas for improvement, in bullet point form, for future cohorts.

Question 1

Most students were able to gain full marks on this question. The most common method seen was to divide 12 by 3 and multiply 8 by 4. Some students set up equations with varying degrees of success but most chose a numerical approach. There was a special case on the mark scheme for students who treated 12 as the total number of goals but this was seldom applied for this cohort.

Question 2

This question was generally answered well with most students able to gain full marks for an answer of 2160. Common incorrect answers generally came from using a value consistent within the range such as the upper bound to find their products or doing further work with 2160 such as dividing by 30 to find the mean. Another common incorrect method included totalling the mid values and then multiplying the frequencies by 30.

Question 3

This question was answered well with the majority of students able to gain 4 marks for an answer of 62.3 or better. Of those that didn't, many gained the first 2 method marks for either finding the total income or the total profit for the notebooks but went on from there with an incorrect method such as expenditure ÷ income × 100 or income ÷ expenditure × 100, forgetting to subtract 100.

Question 4

Part (a) saw mixed results for this cohort and the full range of marks were awarded. Some students did manage to interpret the information correctly, find a correct translation vector (or equivalent) and correct values for *d*, *e* and *f*. Some students were able to find the change in either the *x* or *y* direction and this usually led to 1 or 2 marks respectively. Some students could not find the change in either direction and guessed values, leading to 0 marks unless correct. Part (b) also saw mixed results; some students gained full marks for describing the 3 aspects correctly but many lost marks due to including descriptions of other transformations in their answer, with translation being the most common. It should be noted that the question asked for a single transformation so no other transformations should be described, for example scale factor 3 along with the mention of a vector such as $\begin{pmatrix} 6 \\ 0 \end{pmatrix}$ or 'move right 6' contradicts this aspect and is B0. Students should also be reminded of the need to use correct terminology. 'Increase' was used by a small number of students and did not gain a mark. Part (c) saw more success with a most students able to rotate the shape correctly and draw it in the correct position. Of those that didn't, drawing the shape with the correct orientation in the incorrect position and rotating the shape 90° anticlockwise correctly were often seen, both earning one mark.

Question 5

Most students recognised that Pythagoras' Theorem needed to be used to work out the length of *AB*/*DC* (although a very small number attempted the less efficient method of trigonometry with varying degrees of success). Most were successful with their method to find *AB*/*DC* and went on to correctly work out the perimeter. Of those that didn't, the most common error was in the adding of the lengths, either adding incorrect values e.g.

9 + 9 + 6 + 6 or writing a correct sum but giving an answer of 27.6, presumably missing a 6 when typing into their calculator.

Question 6

A good number of students were able to gain 2 marks for a correct simplification in part (a). Of those that didn't, one mark was often gained for 2 correct terms as part of a product, with the numerical term usually incorrect; 2 or 6 instead of 8 was often seen. Some students did nothing with the powers or had powers of 7 and 10, presumably from adding 4 and 7 to 3 respectively. In part (b), the majority of students were unable to gain B1 for an answer of 5. The most common incorrect answer seen was 1. In part (c), many students were able to give a full correct factorisation. Of those that didn't, one mark was often gained for a correct partial factorisation with at least 2 factors taken out, usually 4*ab*, or for a correct factor taken out with one error, often a power 2 on the *a* in the bracket. Some students were clearly unsure of what to do and gave incorrect answers such as $36a^5b^4$. Part (d) was answered well with most students able to give a correct factorisation in (i) and correct values in (ii). Of those that didn't, mixing up the signs in the brackets was the most common error seen, still gaining 1 mark and potentially B1ft in (ii). Quite a few students started again in part (ii), not understanding the meaning of 'hence'.

Question 7

This question saw varied success. Some students were able to find the equation of the 3 lines and correctly interpret the region and give the correct inequality signs. Some made 1 or 2 sign errors which could still gain 2 or 3 marks if everything else was correct. Some students gained Special Case B2 for inequalities with all the signs the wrong way round. Some students were able to find the equations for all 3 lines but did not write inequalities, gaining only 1 mark.

Question 8

Part (a) was answered well with many students gaining 2 marks for a method and correct answer. The question asked for working to be shown so a correct answer without a method worth M1 gained 0 marks. The answer could be given with or without powers and both were seen on a regular basis. The most common methods seen were factor trees and in a table. Part (b) saw more mixed results with some students unable to correctly work with the prime factors and reach the LCM of 5*A* and 7*B*. That said, many students gained M1 for writing 5*A* as 1800 or 7*B* as 3780 and some then went onto gain the A mark for an answer of 37,800. Some students also gained M1 for an answer of 1080 (finding the LCM of *A* and *B*). There were two common incorrect methods. One was to find the HCF of *A* and *B*; the other involved multiplying the indices by 5 or 7.

Question 9

This question was generally answered well with most students able to provide a clear algebraic method followed by the correct answers. Some students reached as far as a simplified equation for *x* e.g. $19x = 9.5$ but then worked out *x* as 2; they could still gain M2 if this value was substituted into an equation and this was often the case. Some students used a trial and improvement method or no method at all and gave the correct answers; this gained 0 marks as the A mark was dependent on M1.

Question 10

This question saw very varied results for this cohort. Many students did not seem to have an idea of how to approach the question and common incorrect methods included finding the mean and subtracting ¼ of 15 from ¾ of 15. Some candidates understood the process of finding the IQR, but scored no marks because they tried

to find the difference between the 3.75th and 11.25th value. Some students were able to correctly identify 25 and 15 and those that did generally went onto gain 2 marks for an answer of 10.

Question 11

Part (a) was generally answered well with most gaining 2 marks; some gained 1 mark for 2 correct terms, with $2x$ given as x and -20 as $-20x$ or absent the most common errors. Part (b) also saw plenty of students correctly equate $\mathrm{d}y/\mathrm{d}x$ to 4 and go onto rearrange and solve to gain 4 marks. Some students equated $\mathrm{d}y/\mathrm{d}x$ to 4 and rearranged but could not solve, gaining 2 marks whereas others set $\mathrm{d}y/\mathrm{d}x$ equal to 0 and therefore could only gain the 3rd M1 for a method to solve – it is important the method is always shown as if using inaccurate values, we must see the method to be able to award any marks.

Question 12

Part (a) was generally answered well with the majority of students giving the correct answer of 28. For part (b), the scores were more mixed, some students were unable to interpret the demand correctly and gave an answer of 38, which is the cumulative frequency for a height of 35 centimetres, presumably read off as it is the mid-interval value for $30 < \text{Height} \leq 40$. Some gave an answer of 44, perhaps missing ' 30 < ' in the question. Part (c) was also generally answered well with many students able to give a correct answer of 12. It is important that the method for reading off the graph is shown, if the answer was inaccurate e.g. 11 coming from 50 – 39, M1 could only be awarded if evidence was provided that 39 had come from a reading from a height of 35 centimetres; writing readings on the axes is another way to provide evidence on a question like this.

Question 13

This question saw mixed results with the full range of marks awarded. Some students approached the method correctly, finding the gradient and then using this and a set of coordinates to establish a correct equation for the line. Some students were able to find a correct gradient but then could not go any further, whereas others made an error with the gradient, e.g. doing change in x / change in y, but then used their gradient correctly in an equation with a set of coordinates to gain the second M mark. Quite a few students correctly found the gradient but then did extra work of finding the midpoint before substituting. It is evident that students found difficulty in dealing with the negative numbers when calculating the gradient or the intercept.

Question 14

The majority of students were not able to gain the full 3 marks on this question. The most common scores seen were 0 and 1, with 1 mark often awarded for either $2(25g^2 - 9)$ or $(5g + 3)(5g - 3)$. Some students found the difference of two squares using surds $(5\sqrt{2}g + 3\sqrt{2})(5\sqrt{2}g - 3\sqrt{2})$ which scored 0.

Question 15

In part (a) a good number of students were able to work with indices and reach a correct answer of -2.5. The A mark was dependent on M1 so working needed to be seen and converting the terms into irrational decimals was not included in the method marks. Some students were able to change some or all of the 3 terms on the left hand side into powers of 2, gaining 1 or 2 marks respectively. There were plenty of solutions seen where students did not appear to have a grasp of the topic and therefore gained 0 marks. In part (b) a good number of students were able to correctly find 4% of 4.5×10^{157} and give their answer in standard form. Some students managed the first step but then could not convert their answer into standard form. Others found 4% of 4.5 and 4% of 157, gaining 0 marks.

Question 16

Part (a) of this Venn diagram question was answered well with many students able find the value of x as 6. Part (b) saw less success with around half of the cohort unable to give the correct answer of 36; 29 was often seen, presumably missing the 7 from outside the circles. Part (c) saw similar levels of success to (b); the most common incorrect answer seen was 5, 10 e.g. students failing to add together to get the correct answer of 15.

Question 17

In part (a), it was pleasing to see a good number of the cohort understand that the denominator could not be equal to zero and go on to gain B1 for a correct answer. Part (b) saw mixed results; some students substituted h(x) into g correctly and went onto rearrange and solve after setting equal to 1 for 3 marks. Some students did everything right except they ignored the domain for x and gave ±2 as their answer, losing the A mark. Some students approached the question incorrectly and calculated gh(1); this could still gain Special Case B1 if done accurately for an answer of 2.2 or equivalent.

Question 18

A good number of students were able to gain 4 marks on this histograms question. A variety of methods were seen using different areas and scales from the bars. Of those who did not gain full marks, 2 marks was often awarded for either 2 correct frequencies in the table or 3 correct frequency densities calculated for the information given in the table. Some students treated the histogram like a bar chart in that height was equivalent to frequency and gained 0 marks.

Question 19

In part (a) students generally did well, scoring 1 mark for a correct vector. A fully correct answer was rarely seen in part (b). Some students picked up marks for a vector written in one or two ways, with vectors *AB, MB* and *AP* being the most commonly seen, presumably because vector *AN* had been found in part (a). Even if two different vectors had been found, many were unable to equate their coefficients of **a** and **b** and gained no further marks.

Question 20

It was pleasing to see some students gain full marks on this arithmetic series question. Of those that did not, some were able to set up two linear equations in a and d but go no further. Those that found values for a and d then had difficulty solving the quadratic equation successfully. Some students made it all the way to solving a correct quadratic to gain answers of 57 and −24 but did not select 57 as their answer, losing the A mark.

Question 21

In part (a), some students were able to interpret the transformation correctly; the most common incorrect answers seen were (2, 5) and (2, 1). Part (b) was not answered quite as well with many students leaving the answer line blank or giving an answer of (18, 5).

Question 22

This question proved a step too far for the majority of this cohort. Some were able to interpret the information correctly and make some progress, often getting as far as M3 after finding the area of the large circle and the pentagon. Dealing with the concept of the shaded area and unshaded area made this a top grade question and only the high achieving few were able to get beyond this point and progress to a correct answer. A common incorrect method was to assume the radius of the large circle was 8, gaining 0 marks.

Question 23

In this question the first method mark could be gained for finding the sum of the top and bottom face of the frustum and this was seen often. Students found it hard to make progress beyond this point, although some were able to work with Pythagoras and areas to find the total surface area. A common error was to take the perpendicular slant height of the trapezium as 30 instead of using Pythagoras to calculate it.

Summary

Based on their performance in this paper, students should:

- Ensure they use their calculators to check their mental addition of decimals.
- Ensure that on a 'show that' question they work through each step clearly.
- Ensure that they read the question carefully and where method is required, they ensure method is written which will avoid the loss of marks unnecessarily.
- Ensure method is written for questions even when not required to ensure method marks are achieved despite any arithmetic errors that may creep in.
- Know the terminology for the 4 types of transformation and understand what is meant by 'a single transformation'.
- Be reminded of the difference between an expression and an equation and that expressions cannot be divided through to simplify.
- Be reminded of the difference between factorising and solving.
- Use the marks for each question as a guide for how much work is needed in each question. 3 marks is unlikely to be one line of working.
- Try to present their working out in a clear and methodical way, avoiding different parts of the method being scattered about the page.
- Make use of diagrams – annotate them where given to help them to understand the correct approach to take.
- Should be aware that they need to fully document methods even on a calculator paper, and need to understand that some questions require a 'non-calculator' method to be applied to gain the marks.
- Show their substitutions into any formulae they use.
- Make their writing legible and present working as a series of logical steps.
- Students must, when asked, show their working or risk gaining no marks for correct answers.

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