Principal Examiner Feedback

Summer 2016

Pearson Edexcel GCSE
In Mathematics A (1MA0)
Higher (Non-Calculator) Paper 1H

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GCSE Mathematics 1MA0
Principal Examiner Feedback – Higher Paper 1

Introduction

It was pleasing to see that most of the students made an attempt to indicate how they worked out their answers but logic and structure was lacking from many solutions. Students need to improve the quality of the presentation of their work and where a question is testing the quality of written communication (QWC), it is essential that students show a complete method and clearly state a final conclusion, without which it was difficult to ascertain the students' intentions.

Poorly written figures caused problems and students need to be aware that they could lose valuable marks if they don't make their figures clear.

It was disappointing to see marks lost through poor arithmetical skills, multiplication was particularly weak.

Report on individual questions

Question 1

Most students scored marks on this question, the majority showing their method, correctly multiplying and identifying that units of volume were needed. Weaker students could not multiply 30 and 25 correctly with the incorrect answer 650 being quite common. It was pleasing to see that the majority of students realised units were needed.

Question 2

In part (a) the vast majority of students successfully reflected the shape but many did not use the correct line of reflection. Typical mistakes included reflecting in $x = 1$, $y = -1$ and the y-axis. On the whole students showed care in their drawings with straight lines and accurate plotting. Centres should focus on ensuring students can identify and draw the line of reflection.

A significant number of students scored maximum marks in part (b). Most of those who did not achieve full marks were awarded a mark for a rotation of 90° either by rotating about the wrong centre but with the shape in the correct quadrant or by rotating clockwise. Again centres need to ensure students can identify the correct centre of rotation.

Question 3

In part (a) most students gained one mark for 'no time frame' and then another mark for an answer relating to "vague boxes". However, a common incorrect answer was "not enough boxes" which scored no marks.

In part (b) The vast majority of responses included a question and at least three response boxes. The main error was failing to include a time frame within the question. Many students asked "how many packets" rather than "how often" which gained no marks but they could be awarded the mark for correct response boxes. Common errors were overlapping boxes, zero missed out or using inequalities.

In part (c) Most gave sensible reasons relating to age, friendship or size of group. Writing "biased" or "random" without saying why is insufficient.

It was pleasing to see that very few students used a data collection approach.

Question 4

Parts (a) and (b) were very well answered by the majority of students. It was pleasing to see that most students wrote indices correctly. In part (c) a common wrong answer was k^5. For part (d) most students were able to gain one mark for the multiplying out of 3(m+4). The most common error was to incorrectly deal with the '-2'. Part (e) was generally correctly answered by those who attempted it.

Question 5

Many students scored full marks. The most common error was poor calculation of $\frac{900}{20}$ with answers of 40.5, 405 or 450. Students who tried to calculate the accurate answer rather than an estimate failed to score any marks despite having done copious amounts of working out.

Question 6

Many students scored full marks. Most arrived at the correct answer of 90 either by finding $\frac{1}{5}$ then $\frac{5}{5}$ or by finding the number of female centres and adding on.

Common errors were not adding 54 to 36, equating 36 to $\frac{3}{5}$ or dividing 36 by 5. It was pleasing to see that the majority of students showed suitable working out, meaning that if there was an arithmetic error they could still be awarded method marks.

Question 7

Most students were able to score at least one mark and many were able to score full marks. Those who split the diagram and wrote the dimensions on their rectangles scored well. A common error when splitting into two small rectangles and one large was in assuming that 6 and 10 were the dimensions of the larger rectangle. The calculation of the total area did prove challenging for some; the most common wrong answer was 70, obtained from 60 + 5 + 5 or 40 + 15 + 15. However, those who made this mistake often went on to achieve 3 out of 5 marks. Clear stages of working are what is needed to approach a problem like this. The presentation of solutions seems to have improved compared with previous years.

Question 8

Many achieved full marks by understanding $\frac{16}{80}$ was a $\frac{1}{5}$th and then dividing 300 by 5. Those who did $\frac{300}{80}$ often made numerical errors. Some tried a build up method to 320 but failed to show how they were using the result. Having seen the word 'estimate' many students mistakenly rounded figures to do the calculation. Students need to understand that any question which has experimental data will always say 'estimate' but accurate answers are required.

Question 9

This question was much better answered that in previous series. The most common error was T = x + y. A significant number of students factorised their answer although this was not required. However, those who divided by 5 lost a mark.

Question 10

This question was not answered very well as many students found the mid-point of the line MP.

Those who did try to find the co-ordinates of Q often gave the correct answer or gained part marks for either calculating one coordinate correctly or finding the difference between the *x* or *y* coordinates of M and P. A good number of students made errors but then realised from the diagram that they needed to check and were able to correct their answer and score full marks. This is good exam technique and is to be encouraged.

Question 11

It was very pleasing to see that the vast majority of students approached this question by using a two-way table. As a result it was very well done with majority of students gaining full marks. For those students who did not use a table some responses were difficult to follow, with numbers and calculations containing no written explanation as to the category or gender. Some students showed good practice by checking their final solution with the given information.

Question 12

This question was generally done well by those who used the formula for the area of a circle and correctly identified the radius. There were many students who arrived at the correct answer but then incorrectly "simplified", usually getting 75π, which was penalised. Students' inability to communicate mathematically often lost a simple method mark. Centres should emphasise the understanding of 'give your answer in terms of π' as some students wasted time doing calculations using the numerical value.

Question 13

Only a few students made use of the first approach shown on the scheme, calculating 20% of 30% but where seen these were always the most efficient solutions. Neither did many make use of 1.2 as a multiplier. The majority found £240 to be 30% of 800, and some of these went on to find 20% of 240. Few of these continued on to get the correct overall percentage. Many students found the £240 value but then added 20% of 800. Others struggled to convert $\frac{288}{800}$ to a percentage choosing to try division rather than simplifying the fraction. Disappointingly, a significant minority simply added 20 and 30 to get 50%

Question 14

For part (a) most students scored marks. The correct construction method was the most successful. Some students lost marks where it was clear the compass settings were changed or adjusted mid construction. Compasses should be well maintained. The most common error was to draw arcs from the ends of the given lines.

In part (b) marks were obtained by the majority of those who attempted this part. It was disappointing that many constructed a perpendicular bisector of QR which did not pass through the point P.

Students need to leave full construction arcs in their final solution; these were sometimes difficult to assess as they were partially erased.

Question 15

It was pleasing to see that nearly all students attempted part (a). The best students compared both the median and range or interquartile range and gave their comparisons in the context of wages. A significant number of students used conjunctions such as "whereas" which, alone do not compare two figures. Many students focused on less important features such as the lowest and highest values or used imprecise or incorrect terminology, such as "spread", "mean" or "average". A significant number of students listed values from the box plots without making an attempt to compare them. Median was often to referred to as 'medium' which cannot be credited. Poor handwriting made it difficult to distinguish between 16 and 18.

Centres should ensure students use correct terminology, understand comparative language and can add context to comparisons.

Part (b) was not answered well. Most gained no marks as answers tended to concentrate on calculations with values from the wages rather than realising the properties of box plots.

Some identified £130 as the LQ but then could not progress any further.

Question 16

This question proved difficult for many students. Students really struggled with the manipulation of standard form. Many of those who worked with standard form could not correctly handle the negative index in division. Of those that managed to do the division correctly, few were able to convert 0.7 x 109 to correct standard form. A significant number of students converted standard form to ordinary numbers but then usually encountered difficulties when trying to evaluate 3500000 ÷ 0.005

Question 17

Part (a) was answered well by the majority of students although the inequality sign was sometimes replaced with '=', making 'x=7' a common answer. Centres should endeavour to teach students to keep the sign throughout their working to avoid forgetting to put it back in on the answer line.

Part (b) was not so well done. Many students knew they had to multiply both sides by 4 but this was often done incorrectly with many cases of 4 + w seen or 44 - 4w. Students who were successful with the first method mark often lost marks by incorrectly isolating w, with 3w commonly seen. It was disappointing to see students get as far as 7 = 5w then giving their answer as $\frac{5}{7}$. Students should be encouraged to leave their final answer as a fraction as converting to decimal is unnecessary and frequently results in errors.

Question 18

In part (a) the majority of students were able to convert at least one of the given fractions to an improper fraction. Some students confused techniques for other operations at this point and tried to express the fractions with a common denominator. Those that were successful in achieving the correct multiplication were often unable to convert back to a mixed fraction in its simplest form. The most common answers were $\frac{42}{15}$, $\frac{14}{5}$ or $\frac{212}{15}$

In part (b) students generally scored full marks or no marks. Many who converted to improper fractions were unable to convert these to fractions with the same common denominator. Often they found the common denominator but failed to find the correct numerator. Very few subtracted the whole numbers and then dealt with the fractions. There appears to be widespread misunderstanding of the processes involved.

Question 19

Part (a) was poorly answered. Those that attempted part (i) often misread the scale on the axes and part (ii) was often left blank. Some attempted to translate the graph but were inaccurate and those who drew the line at $y=4$ often only gave one correct value.

Part (b) was often not attempted. Those who understood that they needed to draw the line $x + y=6$ often gave their answer as coordinates. Algebraic methods were rarely successful.

Question 20

There were some fully correct answers and a significant number of students gained some marks in this question. Many were awarded one mark for PSR = 42° and many students gave the correct reason as well. A significant number of students correctly found the value of MST = 69° but the reasons were often inaccurate ("edge" was often used instead of "circumference", "alternate angle" instead of "alternate segment theorem"). Students need to use the words underlined on the mark scheme. Those who marked the values of the angles on the diagram tended to gain more marks than those who tried to identify the angles by name, as it was not always clear which angles they were referring to.

Question 21

Part (a) was generally answered well with most students being able to score at least one mark. A large number of students gained a mark for writing correct probabilities on the first set of branches but failed to arrive at the correct values for the second set of branches. A common mistake was 1 – 0.95 = 0.5 for one of the probabilities on the final branches.

In part b) a significant number of students achieved the method mark although many could not multiply 0.8 x 0.05 correctly with an answer of 0.4 being common.

Question 22

This question was often not attempted. Most students started by manipulating the right hand side of the equation, many making errors in the order of operations. Of those who correctly achieved the first step some were let down by simple arithmetical errors or then struggled to rearrange the equation so that the quadratic equalled 0. Very few students tried the alternative method of finding the square root of both sides as their first step, of those who did the majority ended up with only one solution.

Question 23

Students did relatively well on part (a) of this question but rarely scored any further marks. It was clear that pupils understood the simple basics of vectors but were unable to deal with the complexity of ratios. For part (b) some students knew to add one quarter of vector *PR* on to vector *OP*, but failed to multiply all of vector *PR* by $\frac{1}{4}$. Simplification of algebra with negative signs caused problems too. Some students applied the ratio incorrectly, thinking that *S* was $\frac{1}{3}$ of the way along *PR*. In part (c) those who calculated vector *OS* correctly in part (b) generally went on to gain marks.

Question 24

Very few wrote down the relationship in algebraic form or the value of the constant equated to 100. Whilst most had some understanding of the term inverse relationship many students treated the proportionality statement as the equation $y = \frac{1}{x^2}$ and thus completed the table with 1, 0.25, 0.04.

Question 25

Very few attempted this question and of those that did few gained full marks. Areas of triangles were attempted to gain partial credit, but often '$\frac{1}{2}$' was omitted. Working was often poorly presented and attempts at simplifying surds were generally weak.

Summary

Based on their performance in this paper, students should:

- improve the quality of the presentation of their work
- ensure that a complete method of solution is shown and clearly state a final conclusion in questions testing quality of written communication
- practice basic arithmetical skills with integers, decimals and fractions
- practice drawing lines such as $x = -1$
- ensure they understand the meaning of the word 'estimate' within probability and relative frequency questions
- clearly identify, either in the working or on the diagram, angles found as part of the solution to geometric problems

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