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Principal Examiner Feedback

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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

The paper was accessible to students who had been prepared for a higher GCSE Mathematics paper. It was evident from the scripts seen that many students were not taught the full coverage of the specification or were not able to display full understanding of the whole specification.

The standard of work seen was good in places but many students were unable to deal with the later questions.

There was an abundance of working out in some questions which was poorly organised and often confused. The basic level of arithmetic seen was often poor even the short division of 108 by 3 posed significant problems for many as did 12.1 x 1000. Basic errors in simple concepts were often seen, for example, working out an area or measuring a bearing.

Reports on Individual Questions

Question 1

A number of fully correct solutions were seen. Where full marks were not awarded many students were awarded 2 marks for 3 or 4 correct vertices or for an enlargement by scale factor of 3 but not from the given centre. Often candidates did not enlarge all 5 sides by a scale factor of 3, or missed one of the sides off completely, giving a quadrilateral rather than a pentagon as their final solution.

Question 2

Most students were able to score marks on this question. Many scored 3 marks due to inaccurate multiplication or subtraction so losing the A1 for digits 1760. Many gained one mark for showing that the multiplication of 18 and £6.45 was the necessary method. A build up method was sometimes used but often lead to an incorrect total. Those who drew a grid for their multiplication also made errors. Some candidates split 18 x 6 and 18 x 45 but they were then confused as to where the decimal point should go. Some wrote the subtraction the wrong way round and some added on to 98.50 to get to 100 then added on their value over 100 to try to find the difference, most of these methods were inaccurate. Basic arithmetic was required but this was rarely accurate.

Question 3

In part (a) many correct solutions of 4 were seen for full marks. Where marks were not awarded this was invariably where students attempted to divide 20 counters into the ratio 1: 5, 20 ÷ 6 = 3 remainder 2 was often seen.
In part (b) candidates were generally able to use the ratio 1:2 to work out that there were 10 red counters in total, this was often given as the final answer

rather than progressing to give the answer that 6 red counters had been added. Only arriving at a value of 10 was not sufficient for a mark, the complete method to find the extra number of red counters was required for the method mark.

Question 4

In part (a) many students gave the correct answer. The most popular incorrect answers were 3 and 8. These showed a misinterpretation of the question and centres are encouraged to advise students to read the question carefully.

Part (b) was a well answered question, with only the weakest of students unable to score any marks. Most students drew a single horizontal line followed by a straight line with the correct gradient and length, down to the time axis. The remaining students drew lines which did not reach the time axis, diagonal lines going up or even lines going back in time. Some missed out the horizontal line but then drew the next line at the correct gradient and length which gained a mark.

Question 5

A substantial number of student responses were not rectangles and thus did not score any marks. A wide variety of incorrect rectangles were given as answers for this question with those that had one-dimension correct scoring one mark. A number of responses were the correct rectangle of width 2 cm and height 3 cm, but did not include the required horizontal line; this line was required for full marks.

Question 6

In part (a) a variety of answers were seen. Some students gave the correct interval but others felt the need to give a value for example, 55 or 60 were common incorrect answers. Some students gave a frequency as an answer.

For part (b) students who correctly plotted the middle of the interval invariably scored full marks by joining all points with straight line segments, it was pleasing to note that the majority of candidates used a ruler rather than attempting freehand line segments. Some students are still losing a mark by joining the first and last points to complete the 'polygon'. However, the most common error seen was to plot the points at the end of the interval, if these were joined with straight line segments a mark was awarded.

Question 7

Students found this question difficult. They often found the area of the pond but rarely knew what to do beyond this to show a full method of finding the area to be covered in gravel. Area and perimeter were confused and some students just added all the figures given in the question. Many students thought the width of the outer rectangle was 7, only allowing for one path edge. There was a realisation that division by 10 was required and then that a whole number of bags should be bought. However, the modal score was 2 marks as a full method was rarely seen.

Question 8

Most students scored some marks for this question. However, many students showed a poor understanding of the order of the steps required to work out the price for Mega Bathrooms. Some just reduced the price by 75% in one step. More often those who were successful in finding 60% of 1500 then made the mistake of either calculating 15% of this value (900) or calculating 15% of 1500. A minority of students were able to reduce 1500 by 60% and then by a further 15%, for Mega Bathrooms. For Bathroom Mart some students tried to change $\frac{1}{3}$ or $\frac{2}{3}$ into a percentage without success. Common errors were $\frac{2}{3}$ = 75% or calculating $\frac{2}{3}$ of the price and failing to realise that they then needed to subtract this from the original price. Centres should encourage students to work with simple fractions as division by 3 is far simpler than trying to calculate 66.6% (or better) of any figure, especially without a calculator. Centres should also encourage candidates to show full working when using the breakdown method for percentages. It was pleasing to see that almost all students wrote their conclusion clearly.

Question 9

A significant majority of students scored 1 mark, usually for showing that angle *CBD* =55, this was often correctly placed on the diagram. They then progressed to finding angle *CDB* = 95 but from here were not always able to make the final step to obtain the answer of x = 95. Often reasons were not even attempted by candidates, where they were they were often lacking in the required vocabulary, just stating "parallel lines" is not sufficient or some students believed that angles *EDB* and *CBD* were alternate angles because of the "Z" shape that was created; the same with angles *CDB* and *ABD*. Very few candidates knew the angle facts for corresponding or co-interior angles. On the whole the structure of the working was poor and candidates should be encouraged to annotate the diagram with all the angles they find and give the reasons they use; inevitably there were those who just listed all the reasons they knew in the hope that something would score a mark. This is not an acceptable approach, only valid reasons should be given.

Question 10

Part (a) saw a number of correct answers and many that scored 1 mark. A common mistake was for students to draw an open circle at 3 and then a line with an arrow in the wrong direction. Another common error was to draw two circles, often the second was at $x = -4$.

For part (b) a substantial number of students solved the inequality by treating it as an equation, this often meant that they correctly found x = 5, BUT then they failed to deal with the inequality for their final answer, this did gain 1 mark. Others failed to apply the correct order of operations, often trying to undo subtract 7, by subtracting 7. A number of students left the solution embedded in the equation. Despite these common errors, many fully correct solutions were seen.

Question 11

This question was not well answered. Most students had the incorrect conversion, with many not even trying to convert and just doing either 240 – 25 or 240 ÷ 25 instead. Very few students knew the conversion 5m = 8km (or equivalent). This meant they were unable to gain any marks. Some who did find 40km or 150miles did not read the question properly and failed to subtract the 25miles already travelled. Some who had done all the correct working failed to gain full marks because they missed the units off their final answer. The incorrect conversion of 10km = 1mile was seen quite often as was 1km= 100 miles.

Question 12

Overall a poor understanding of bearings was displayed. Many students simply gave a distance rather than a bearing in part (a).
In part (b) many students just drew a line to from T to L. Students really must read the question given. Those who did complete a correct bearing did not appreciate that the perpendicular distance from the bearing line to the lighthouse was the shortest distance.

Question 13

Although many candidates did correctly substitute 5 into the given equation it is clear many had a limited understanding of BIDMAS. Many followed 3×5^2 with 15^2 or even 35×35 indicating their confusion with this topic. Many others went straight to 15^2. A significant number of students made arithmetic errors when attempting 3×25.
In part(b) both solutions of ±6 were very rare, however candidates scored full marks for just one of the two correct values. Most students scored 1 mark for trying to divide 108 by 3, many again made arithmetic errors in this basic calculation. Centres are strongly advised to practice basic arithmetic with students in preparation for these papers. Those who did correctly divide by 3 as a first stage often went on to find 6, although a number then divided 36 by 2, showing confusion as to the meaning of square root. A popular incorrect answer was 18 where candidates tried to find the square root first, but divided 108 by 2, and then divided this answer by 3.
Part(c) was often either fully correct or entirely incorrect. Students could either rearrange accurately or showed no understanding at all.

Question 14

A vast number of students did not understand the need to write a SINGLE transformation and just copied the 2 transformations from the question or gave two different transformations. These answers gained no marks.
A minority of students were able to score 1 mark for the diagrams alone even if they did not describe the transformation correctly. Some fully correct descriptions were seen but others were incomplete or gave an incorrect centre.

Question 15

Correct answers to either part of this question were rarely seen. A common error was to look for the midpoint of (3, 5) and (9,2). Some students did gain 1 or 2 marks by sketching the line using the given coordinates and midpoint and then working from their diagram to find the missing coordinates. Strangely this approach often resulted in only one correct coordinate.
Part (b) was often not even attempted. When attempted a fully correct answer was often seen.

Question 16

Some fully correct answers were seen but often notes on how to find a mean were seen and even these notes were incorrect. Where calculations were attempted some students could correctly show 15 × 7 or 9 × 5 but they could not then continue to the correct answer. Common errors seen were answers of 2 (from $7-5$) or 6 (being the number of girls or even the mean of 7 and 5).

Question 17

There were a significant number of students who scored full marks on the question and showed a good understanding of indices and graphs.
Encouragingly, only a very small minority attempted to join points with line segments, most gave a curve.
Of those that were not fully correct the first 2 table values proved the trickiest (2^{-1} and 2^0), with many negative answers (often -2) for the first and 0 for the 2nd. Thus, the evaluating of 2^2 and 2^3 correctly gave a significant number their '2 correct values', which scored 1 mark and allowed consideration of their plotting in (b) for a mark. Unfortunately, many students also gave 2^3 as 6 as well and so scored no marks in part(a) and then could not gain marks in part (b).
In the plotting, most problems were found in the first 2 plots, with the points being shown BELOW the x axis for positive y values.

Question 18

Many students scored 1 mark for the median of 112 for the girls or of 115 for the boys. To gain a mark for comparing the medians the comment needed to be comparative i.e. higher, lower, less than etc. rather than just listing the values. Very few students scored full marks as they had to comment within the context of the data and have all figures used correct. Some students did not understand what the data was about, stating boys did better as their median was higher than the girls even though this showed a slower median finishing time.
Marks were also awarded for finding a correct range or IQR, there was also a lot of confusion between the range and interquartile range with many students identifying the lower and upper quartiles but not working out the difference thereby not gaining the mark.
There was the usual confusion between median, medium and mean. Correct terminology is required.

Question 19
Many students attempted this question with varying degrees of success.

There were errors seen in multiplying by 2 and also when subtracting one equation from another. The need to subtract a negative from a negative proved difficult for many.

If a values was achieved for either x or y, it was usually successfully substituted into an equation but again the arithmetic of the rearrangement was often incorrect. Poor levels of arithmetic held back students in this question.

Question 20

Students were aware of the need to multiply 12.1 by 1000 but found this difficult to do. Many worked out $12 \times 1000 = 12000$ and then tried to insert a 1 somewhere, answers such as 12010 and 12000.1 and 12.1000 were seen, others wrote 121000 without justification. If the correct number 12100 was seen it was rarely written correctly in standard from as the question required.

For part (b) many versions of 4.503 and a series of zeros were seen. It was rare to see a correct solution from clearly set out working. Some students gained marks from interim answers and some fully correct solutions were seen.

Question 21

This similar triangles question proved beyond many, with a great number scoring zero. Relatively few gave fully correct solutions, with a significant number arriving at an incorrect solution by subtracting 1.5 from 5. Others tried to use Pythagoras's Theorem to find the missing length.

Candidates who split the triangles and drew the 2 similar triangles next to each other scored very well, but this approach was seen very rarely.

Question 22

Very few students scored full marks for this question. Most who attempted the question simply added up all the given expressions. Some did try to find a missing length, for example $2x$ – 1 and occasionally an area. The majority of those that tried to find an area did not use brackets for the length of the sides and therefore did not gain the method mark available. At this level correct terminology is required. A few students did try to find the volume of a prism but again a lack of brackets inevitably led to incorrect expressions.

Question 23

There were some fully correct solutions here. However, the most frequently seen response was 38 and 15 for the missing frequencies (which gained no credit), showing no appreciation of the importance of class width in the construction of a histogram. It was rare to see correct labelling of the vertical axis and often the missing block was drawn to a height of 1.6 rather than 0.8

Question 24

Few responses were seen.

The most common response used simple proportion, giving an answer of 150. It was rare to see the use of an inverse square. If a student could show an inverse square they often went on to give a totally correct answer.

Question 25

Very few students scored full marks for this question and many did not attempt the question at all.
A few probability tree diagrams were seen. When these were seen often B1 was scored and sometimes M1 for one product. The next mark was for a complete method and often students failed to complete their chosen approach. There were several different ways to approach this question and some complete methods were seen.

Question 26

Only a very few students attempted this question and some just wrote $2 \times 2 \times 2 = 8$ for answer. Some students gained 1 mark for the squaring and subtracting because they forgot the bracket around the $(2\sqrt{10})^2$. $2\sqrt{10} = 5$ was a common error, very few candidates found *CD*=6 and those who did find *CD* correctly did not take it any further.
Some students made assumptions about the triangle *DEF*, any assumption made must be justified for any answer to be fully correct.

Question 27

Very few students attempted this question and when they did they rarely succeeded in gaining a mark. The most common way a mark was gained was to show a correct expression for the surface area of the sphere. If consideration of the surface area of the cylinder was made it was common to see the circular ends omitted and only the curved surface area used. A common incorrect response was to find the surface area of the sphere as 144π, conclude the surface area of the cylinder was 288π and therefore give the ratio as 1 : 2.

Summary

Based on their performance on this paper, students should:

- read each question carefully then check, at the end of their solution, that they have answered the question as set
- show clear, organised working out for all questions
- practise their basic arithmetic skills
- give full geometric reasons when asked for reasons in geometry questions
- practise working with bearings

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