Examiners' Report
Principal Examiner Feedback

Summer 2017

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

This is the last sitting of syllabus 1MA0 and all students sitting this paper were re-sit students or mature students.

Many students did not attempt the questions towards the end of the paper.

It was encouraging to note that students showed their working on the starred (QWC) questions. However, students do need to state clearly what they are doing and structure their working rather than producing a mass of calculations all over the page.

There were numerous arithmetic errors in even the simplest of calculations. This was particularly evident in question 2 and question 7 where students made errors multiplying with more than one zero in the calculation such as 400 × 40 and 40 × 120 and 50 × 80

Many students struggled with plotting points accurately where the point to be plotted did not fall on the intersection of the given grid lines. This was very evident in Q3, Q13 and Q16.

Report on individual questions

Question 1

The opening question to the paper was well answered by most students. The most common error seen in part (a) was x^{35} although other random incorrect answers were seen such as $2x^{12}$, x^2, x^{15}, x^{30}

There were many correct responses seen to part (b) but there were even more answers of y or $1y$ and it was not uncommon to see $2y$ as the simplification of $2y \div y$

Many students were able to answer part (c) correctly by first working out 3^2 then multiplying by 2. However, some students chose the 2 × 3 × 3 method to reach the correct answer. There were a large number of students who initially multiplied 2 by 3 and then squared 6 to give the incorrect answer of 36. Other common errors were multiplying 2 × 3 initially then multiplying by 2 (rather than squaring) to give 12 OR substituting 3 as a digit for "t" and working out 23^2 or 23 × 2

Although there were many correct methods used in part (d), many students, after showing correct working such as 6 × 4 + 1 = 25, then proceeded to write 25 in the answer space, scoring no marks.

Question 2

It was pleasing to see many fully correct responses with most students scoring some marks on this question. However a lack of accuracy in simple calculations lost many the final mark. It was not uncommon to see 520 × 40 = 28 000 and 40 × 120 = 480. Others started with 400 × 50 = 20 000 but then did not use this calculation in any meaningful way, or went on to find 15% and 30% of 20 000. Many students who did not score full marks lost track of what they were calculating or did not relate their calculations to the question. For example many found the total profit for both laptops (£5,400) but then went on to say that Bill did not make enough profit as they did not take into account the full price of the laptops (£20,000). Many responses were difficult to follow with calculations spread out at random across the page.

A significant proportion of students used the correct method and often correct arithmetic, to arrive at the profit, but went on to erroneously claim that Bill's target had not been met. Correct interpretation of the question and rereading it before drawing any conclusions is essential.

Question 3

Many students did not know where to plot the frequencies and it was common to see points plotted at the upper end of the class interval. These scored one mark. However, many went on to lose this mark as they either plotted one point incorrectly or joined the first and last point to make an "iceberg" effect. Those students who started by drawing a bar chart and then marking the centres of the tops of the bars and joining them tended to make fewer errors in plotting. In part (b), where answers were given, they tended to either correctly identify the modal class interval or write the incorrect answer of 40.

Question 4

Most students scored the first mark for expanding the bracket correctly. However, most of those who continued to try to isolate their terms in x and their numbers tended to score no further marks as they used the process $4x - 2x = 2x$ and $12 - 8 = 4$ ending up with $2x = 4$ so $x = 2$. Many students "lost" the "=" sign and hence the structure of the equation.

Question 5

Students struggled to find the correct value of any angles in this question. Many students tried to apply the rules for angles in parallel lines to this question as they assumed *ABCD* was a rhombus. Most students ignored the information given in the question that the diagram was not drawn accurately and saw a 90° angle at the junction of the intersecting lines. They used this "information" as a base for their calculations which were then incorrect. A starting point should have been realising that being given $AB = BC = BD$ implied there were isosceles triangles in the diagram. However, most of those students who realised triangle *BCD* was isosceles then went on to get angle *DBC* = 72 with angle *DCB* rather than angle *DBC* = 36 scoring no marks. Very few students understood the angle

properties of a kite. Students should be encouraged to look at the words in the stem of the question as a hint as to how to proceed with the question.

Question 6

Some students started by finding the unit weight of 20 in part (a), generally going on to get the correct weights of raisins and oats. However the most common starting point was to find the sum of 3 + 2 + 5 and use this to get answers of 12 and 30, scoring no marks. Part (b) proved more challenging with most students who attempted the question misreading the instructions and thinking there were 300 g of nuts rather than 300 g of breakfast cereal as written in the question. These students then went on to use the incorrect method of proportion saying 50 g of nuts costs 80 p so 300 g costs £4.80 scoring no marks. Many who identified that they had to find 90 g of nuts were unable to go on to find a correct method to obtain the cost.

Question 7

Some students did not read the question carefully enough and attempted to find the volume of the triangular prism. However, many did attempt to find the total surface area but struggled to find the area of the two triangular end faces, often using (50 × 60) ÷ 2 as their method which meant they could only score a maximum of one mark for showing the correct method to obtain the area of two different rectangular faces.

Question 8

Part (a) was well answered with most students scoring at least one mark, generally for a triangle drawn in the correct orientation, and often going on to score the second mark for this triangle being in the correct position.
Part (b) was also well attempted with many students scoring two marks generally for the correct transformation and the correct scale factor. Most students did not provide a centre of enlargement whilst others said the centre was (0, 1) even though many had drawn the lines on the grid showing that the centre was (1, 0). There are still students who write a combination of an enlargement and a translation, and therefore score no marks for writing more than one transformation.

Question 9

Many students did not know what to do with the information given that the probability Jenny selects a girl is $\frac{1}{3}$. Those that did and got to 15 generally went on to establish that there were 4 adults, scoring at least two marks. A common misconception was to assume that the number of adults was also $\frac{1}{3}$ not taking into account that there were 6 boys. Another common incorrect answer was $\frac{1}{11}$

Question 10

Many students recognised that $3n$ was necessary in their expression in part (a) with many of these students going on to write the correct expression for the nth term of this sequence. Many of those who got part (a) correct went on to score at least one mark in (b) with many of these establishing that $n = 100$. The most common error was to answer "no" as 299 is not a multiple of 3 whilst others substituted 299 for n then multiplied by 3. Students tended to struggle with part (c), not realising they had to substitute $n + 1$ for their n in part (a). $3n + 1$ was a common incorrect answer to this part.

Question 11

There were not many fully correct answers but quite a few students scored one or two marks, generally for writing the correct coordinates for *P* or for getting the x-coordinate of *A* correct, or both. Students tended to calculate the mid-point of *QR*, *QS* or *RS* rather than using the given mid-points to calculate the coordinates of the ends of the lines. The most successful students were those who drew a diagram or a grid to identify where the given points were situated.

Question 12

It was very disappointing to see how many students did not use estimation at all in this question with many very long multiplications found all over the page as students struggled to work out the exact value of $3.14 \times 31 \times 31 \times 97.5$. Others did not know what formula to use when calculating the volume of a cylinder. The most common incorrect response was $\pi \times 62$ which led to no marks being awarded.

Question 13

Most students got at least one value for y correct scoring at least one mark which meant they were able to score marks in part (b) for some accurate plotting. However fully correct quadratic curves, accurately plotted, were relatively rare. More care is required plotting points, especially when the points fall between grid lines. Part (c) proved too challenging for most students with the line $y = 3$ seldom seen drawn on the grid.

Question 14

There were not many students who successfully found the total cost of 1 kg of potatoes and 1 kg of carrots. Of those that did, most tried to solve their equations simultaneously rather than go directly to 7 kg potatoes + 7 kg carrots costs 910 pence which could lead directly to the correct answer. Some did score one mark for setting up two appropriate equations using + and = but then struggled to continue. The most common error was to see two equations written as 3 kg + 4 kg = 440 with 4 kg + 3 kg = 470 which scored no marks.

Question 15

A common approach to this question was to bypass Pythagoras' Theorem and to simply use the two numbers given to find an area of a triangle eg 6 × 10 ÷ 2 = 30. Those that started by attempting to find the length of *AB* often went on to score the second mark for either recognising *AD* or *DB* = 4 or sometimes using *AB* = 8 to find the area of triangle *ABC*. The common error at this stage was to say the area of the trapezium = 0.5 × (4 + 5) × 6. Not many of those students who scored two marks went on to do a correct complete method to find the area of the trapezium *BCED*. Other common errors were to use Pythagoras' Theorem incorrectly writing $AB^2 = 10^2 + 6^2$ or to say that the area of triangle *ABC* = (6 × 10) ÷ 2. Surprisingly few students used area (Δ*ACB* – Δ*AED*) to solve this question. Many recognised that the trapezium equation was needed but then failed to identify which were the parallel sides

Question 16

Most students got part (a) correct and then attempted to plot their points. Unfortunately, some students plotted their points at the mid-interval whilst many others struggled to plot the points correctly finding the scale on the vertical axis challenging. As a result it was not uncommon to see students unable to score both available marks for part (b). Many students drew a vertical line from 54 to the graph correctly (although some mistakenly used 52 or 58 from misinterpreting the scale on the x-axis) but then either failed to accurately read their value from the vertical axis or failed to subtract their answer from 200

Question 17

Most students did not show a correct first step to solve the given equation. Some recognised that a common denominator of 12 could be used but then failed to apply this to the right hand side of the equation with $4x + 4 + 6x + 15 = 2$ commonly seen as a first step for these students. Others just wrote $3x + 3 + 8x + 20 = 2$ which scored no marks. Another common incorrect first step was to see $(3x + 6) \div 12 = 2$. However, there were a small minority of students who did obtain the correct answer from valid working. A common error was to just add together the numerators and denominators to obtain $\frac{3x+6}{7}$

Question 18

There were a lot of correct answers to part (a) showing that most students knew how to write a number in standard form. The most common errors came from the power of 10 with 5.4×10^5, 5.4×10^{-6} and 5.4×10^7 seen. Other errors seen came from writing 54 or 540 instead of 5.4

Part (b) also produced many correct responses. The most common error was to write 00032 ie the correct number of zeros and the correct digits but no decimal point at all.

Part (c) proved quite challenging for most with some poor arithmetic errors made when finding the product of 2 and 315 such as $2 \times 315 = 620$ or 635 or 615 or 640. Examples of common totally incorrect answers include 2×10^{9450}, 2×10^{315} and 63^{30}. Some students did manage to score one mark for the figures 63 with $\times 10^n$ but fully correct answers were seldom seen.

Question 19

It was encouraging to see that the majority of students were able to score at least one mark on this question, generally for stating that the male and female students had the same median.

However many used the word "medium" instead of "median" which scored no marks. Some of these students then went on to say that the females had a higher range or interquartile range than the males and a few students were able to put either of their statements into context. Unfortunately many quoted incorrect values for the range or IQR which meant they could not access the mark for this comparison. Students struggled to write a comparison in context which meant three marks on this question was seldom scored. Many students just quoted facts without any comparison, eg "The IQR for females is 42 and the IQR for males is 31". This sort of statement could not score any marks without a comparison being made. When trying to compare range and IQR in context the majority of students who attempted this interpreted a wider range/IQR to mean that females used their phones more rather than identifying less consistent results.

Question 20

There were quite a few correct responses seen to part (a) but the incorrect responses of x^{-5} and x^{-6} were seen very often. Many others made no attempt at all to simplify the expression.

It was rare to find a correct response to part (b) with many students unaware how to factorise a quadratic expression. Those that did attempt the question tended to try to factorise the first two terms with $y(2y - 5) - 3$ being a common incorrect response. Many who had the correct values in two brackets failed to have the correct signs.

Question 21

Not many students were able to score marks on this question. Those that did tended to score one or two marks generally for getting three or four terms correct when substituting into a^2 and b^2 and expanding. However, these students then struggled to subtract the two expressions and use $\sqrt{8} = 2\sqrt{2}$

Question 22

Although most students who attempted this question recognised that angle *ADO* was 90°, most failed to go on to get angle *AOD* = 50°. Those that did tended to say angle *BCD* = 100° or angle *BCD* = 130°. There were many who thought that triangle *AOD* was isosceles writing angle *AOD* = 70°. Correct answers of 155° were rarely seen. Some students also used *OBCD* as a cyclic quadrilateral. Students need to ensure they use the correct mathematical language when giving their reasons and give all necessary detail. For example, "The angle between the tangent and the circle = 90" is not sufficient as the word radius is missing from their reason.

Question 23

In part (a) the most common answer given was $\frac{7}{11}$ showing that many students had no idea how to tackle the question. Some tried to draw a tree diagram and were rewarded by being awarded the first mark for use of 11 and 10 in the denominators. Part (b) proved to be more challenging although some students were able to score one mark for at writing at least two of the probabilities for *BG*, *BR* and/or *GR*. Those who attempted to find the final probability tended to add the 6 different probabilities rather than subtract the probabilities of two counters being the same colour from 1. Many used replacement in both parts.

Question 24

The last question on this paper proved to be a real challenge for nearly all students with many blank responses. A few students were able to score a mark in part (a) generally for finding expressions for *AB* or *BA* and labelling them accordingly. Part (b) was really poorly answered if not blank.

Summary

Based on their performance in this paper, students should:

- Show all their working to gain method marks (particularly when calculating percentages) in case their final answer is incorrect and order work with clear progression of method
- Show any calculated angles on the given diagram when solving a geometric problem and/or be able to define an angle with 3 letters
- Spend more time working without a calculator on calculations such as 40 × 120, 80 × 50, 40 × 60
- Ensure that they provide the centre of enlargement when describing an enlargement
- Draw diagrams to assist them when working out coordinates when no diagram is given

- Practice reading points on graphs where the divisions on the axes increase in numbers other than 1 and also understand the importance of plotting points accurately

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