# Examiners' Report

Principal Examiner Feedback

Summer 2018

Pearson Edexcel International GCSE

In Mathematics A (4MA1) Paper 1HR

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# IGCSE Mathematics 4MA1 1HR Principal Examiners' Report

Students who were well prepared for this paper were able to make a good attempt at all questions. It was encouraging to see some good attempts at topics new to this specification. Of these new questions, students were particularly successful in the question assessing the expansion of three brackets. Students were less successful in applying the formula for density in a problem solving scenario. Students who were prepared themselves for the question on the sum of arithmetic progressions fared well.

On the whole, working was shown and easy to follow through. There were some instances where students failed to read the question properly. For example, in question 4 some students gave the answer as the difference between Lionel's share and the amount of money given to his mother.

Proof, difference of two squares, and indices seemed to be a weakness as does the recall of the Intersecting Secants Theorem. On the whole, problem solving questions and questions assessing mathematical reasoning were tackled well.

**Question 1**

Many students answered this question well. They correctly found the area of the rectangle and the area of the trapezium. However, some students did not substitute the correct numbers in to the formula for the area of the trapezium. A common error was $\frac{1}{2}(16 + 24)10$ when finding the area of the trapezium which leads to an incorrect answer of 480. Some students need to recall the formula for the area of the trapezium in order to answer the question correctly. It was quite surprising some students did not know how to apply the area of a trapezium. Although they used the formula, on some occasions, they substituted in the wrong numbers.

**Question 2**

Many students answered this question well. However, a common error by some students was to use the lower limits or the upper limits to work out $\sum fx$. This method is incorrect and the students need to understand that they must use the mid points. Other common errors were $\frac{495}{5}$ or $\frac{580}{5}$ .

**Question 3**

Part (a) was answered well. Some students have difficulty in reflecting in the line $y = x$. Students are encouraged to draw the line $y = x$ and then reflect the shape. Some students gained a mark by drawing the triangle in the correct orientation but in the wrong place. A common error was to reflect the shape in the line $y = 0$.

Part (b) was answered well.

**Question 4**

This question was answered very well. It was encouraging that many students showed their complete method to obtain 225. Some students lost marks as they worked out 375 – 225 to obtain 150. This is a very good example of how subsequent working cannot be ignored as the final answer does affect the accuracy.

**Question 5**

It was encouraging to see students evaluating their expression when substituting a value into $E$. Many students chose $n = 4$ or $n = 5$ to show that $E$ is not always a prime number. Some students just substituted $n = 1$ or $n = 2$ or $n = 3$ and no further. These students tended to agree with Ali thus losing the final mark.

**Question 6**

It was quite pleasing to see students writing angles on the diagram. However, students are encouraged to use correct notation, for example, angle *GBE* = 50°. Many students did write down 103° but never attributed it to the correct angle. It was disappointing to see some students did not recognise alternate angles or that allied angles add up to 180°. A common error was to correctly state that angle *BEF* is 77° but then stating that angle *CBE* is 77°.

**Question 7**

Part (a) was answered well. Many students showed their working and then wrote down the common form of the answer i.e. $4n + 2$. Some students used the formula for the *n*th term of a sequence and credit was given to write their answer in the form $6 + (n – 1)4$.

Part (b) was answered poorly. It was a simple case of substituting $n + 1$ into their $n^{th}$ term in part (a).

**Question 8**

Parts (a) and (b) were answered very well. A few students wrote down $139 \times 10^4$ or $0.5 \times 10^{-4}$.

**Question 9**

Generally this question was answered well. A number of students did not subtract 0.6 from 2.5 others found the volume of the whole cuboid and then subtracted 0.6, thus not being able to score anymore marks as they were no longer working with a volume. Some students converted their measurements into centimetres, found the volume of 68400000 and then tried to multiply by 1000 and divide by 400. These students did not realise the volume, in $cm^3$, needed to be converted into $m^3$ by using the correct conversion factor of $10^6$. Some students lost marks simply because they did not know how to convert minutes to hours and minutes.

**Question 10**

Many students answered this question well and showed a clear method. Some students made simple arithmetical errors, however, several students did not know whether to add or subtract the two linear equations. Students had to start with an algebraic method leading to a correct equation with one unknown to gain the first method mark. The awarding of the accuracy marks were dependent on gaining the method marks. Correct answers by trial and error or using a calculator were rare but gained no credit.

**Question 11**

This question was answered well by the majority of students. It was encouraging to see students writing a clear method leading to a correct answer of 20

**Question 12**

Part (a) of the question was answered well. Many students worked out the total number of cars then they worked out the number of extra cars sold in 2017 thus leading to a correct answer of 20%. Some students worked out $\frac{420}{350}\times 100 = 120$ but did not subtract 100 from 120 to complete their method and obtain the correct answer.

Part (b) of this question was not answered too well. If they did attempt the question they used an incorrect method such as dividing 500 000 by 1.08 thus obtaining an incorrect answer. The students who were successful in answering the question showed a clear method.

**Question 13**

Many students answered this question well, finding the common denominator in order to add the two fractions. They took their answer away from 1 and found the fraction for other living expenses. At this point some students converted their answers into decimals or percentages leading to inaccurate answers of £899.94. This approach lost the final accuracy mark. Some students attempted to find $\frac{1}{3}$ or $\frac{1}{5}$ of $420 thus losing all marks.

**Question 14**

Parts (a) and (b) were well answered. Students should be careful when writing their answers on the answer lines as transcription errors can be easily made.

Part (c) was a challenging question. Students were able to gain a mark by showing an appreciation of $\sqrt{a} = a^{\frac{1}{2}}$ or $1 - -2 = 1 + 2$. Not being able to recall the index laws was a problem for many students. A common error was to write $\sqrt{a} = a^2$.

Part (d) was a very challenging question and poorly attempted since many students did not realise that the denominator was a difference of two squares.

**Question 15**

Generally this question was answered well. Some students only drew in one rather than two extra set of branches. This error meant that only one mark could be awarded in part (a). Part (b) and (c) was completed more successfully with many who failed to gain full marks in part (a) going on to gain full marks in part (b) and (c).

**Question 16**

Part (a) was a challenging question. Students who were well prepared showed their algebraic method clearly leading to a quadratic equation. Some students could not recall the Intersecting Secants Theorem and tried to work backwards from the given quadratic equation thus gaining no marks.

Part (b) was generally answered well. Students were told to 'show your working clearly' for this question; the vast majority doing so. Students who did not show correct working gained **no** marks. The majority of students were able to use the quadratic formula correctly and gain full marks. Some students forgot to add the 4 to 16.6 thus losing the final accuracy mark.

**Question 17**

This question was answered well by many students. This was a standard histogram question set on the paper. Some did lose a mark by drawing bar heights in the correct ratio to the ones given in the mark scheme. Unless they relabelled the frequency density axis or provided a key, these students were limited to 2 marks. Some students decided to divide each frequency by the corresponding midpoint value in the class interval, or by the upper limit. A minority mis-drew the last two bars at the heights of 1.7 and 1.8 by misreading the scale. Another common error was to divide by the midpoint or end points of the table to find their 'frequency density'.

**Question 18**

Many students recognised that the first part of the question was the application of the cosine rule. As such, most made a successful start to the problem. A large number of students completed correctly to give an answer of 17.4. Errors on the way to the answer included inaccurate applications of correct operator precedence (BIDMAS) and a lack of square rooting a correctly evaluated expression. More able students identified the need to use the sine rule and they applied it accurately. In some instances, mistakes were made in rearranging the original equation or using 120° instead of 27°. Many students worked out the angle to be 61.6° and successfully found 91.4°. Some students left the answer as 61.6° thus losing the final accuracy mark. It was pleasing to see many students writing their methods clearly.

**Question 19**

Many students found this question challenging. Most students who were able to differentiate correctly, although a few forgot that the '*k*' should no longer be there, appreciated the need to equate their answer to zero, although some moved straight towards solving an equation without stating it first. These students tended to find $x^2 = 9$ and stated $x = 3$ not $x = \pm 3$ thus losing the accuracy mark. The diagram in the question did direct the students to two $x$ values but this was overlooked by some. Some failed to find any an expression of $y$ in terms of $k$ or a value using $k < 54$. Most students found it challenging to work out the difference between $b$ and $d$.

**Question 20**

This question was not answered well. Those who understood how to find an inverse function were generally successful. Many students gained a mark for substituting $\frac{x+1}{2}$ into $1+\frac{1}{x}$ and obtained the correct unsimplified equation of $= 1 + \frac{1}{\frac{x+1}{2}}$ . Many students lost the final 3 marks due to poor algebraic manipulation. Common errors by the students was to write the next step as $y\left(\frac{x+1}{2}\right) = 1 + 1$ or $2y = 2 + \frac{1}{x+1}$. Gaining full marks required an ability to rearrange equations. The latter was beyond a large number of students, often because they did not grasp the principal of using factorisation to isolate the intended subject of the formula.

**Question 21**

Part (a) was answered well. Many students multiplied out the brackets correctly and clearly showed their method.

Part (b) was a very challenging question. A minority of the students obtained full marks. Many students did not realise they had to use part (a) and tried to prove the difference between a whole number and the cube of this number is always a multiple of 6 through a numerical method which gained no marks. Students did not realise that $x(x - 1)(x + 1)$ when rearranged gives $(x - 1)\ x\ (x + 1)$ i.e. three consecutive numbers.

**Question 22**

This question was not answered well. Many students found it difficult to write down a correct expression for the required volume of the shell. Some students worked out the density incorrectly by stating $\frac{15}{11}$ not $\frac{11}{15}$ . The more able students were able to score 4 marks as many forgot to convert 0.039 m into 3.9 cm. A common incomplete method involved students who worked 7.23… and then forgot to add 0.73…. thus losing marks.

**Question 23**

Many students answered this question well, clearly showed their method in obtaining 166 833. Some students did not realise that 999 was the last term. A common method used by students was to find the number of terms by writing 1000 ÷ 3 = 333.333 and using number of terms as 333 thus only gaining 1 mark.

## Summary

Based on their performance in this paper, students should:

- be able to convert $cm^3$ to $m^3$.
- learn, recall and apply the formula for the Intersecting Secants Theorem.
- be able to attribute angles correctly when writing them down and show clear working.
- read the question carefully and review their answer to ensure that the question set is the one that has been answered
- make sure that their working is to a sufficient degree of accuracy that does not affect the required accuracy of the answer.

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