Pearson Edexcel

# Examiners' Report

# Principal Examiner Feedback

## January 2021

Pearson Edexcel International GCSE

In Mathematics (4MB1)

Paper 02R

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**International GCSE Mathematics – 4MB1**

**Principal Examiner Feedback – 4MB1 02R**

**Introduction**

On the whole students were well prepared for this paper and made a good attempt at all questions.

Topics new to the specification were well answered as were the problem solving and reasoning questions.

The question paper did highlight some common problem areas which should receive special attention by centres:

• Understanding the importance of using the universal set correctly

• Understanding the term "percentage profit".

• Understanding how to structure probability calculations particularly understanding when to use selection without replacement

• Knowledge of expected geometrical reasoning vocabulary

• Understanding that $f^{-1}(x)$ indicates an inverse and not a reciprocal.

• Order of matrices for transformations

• Show full working when a question demand is to "show that…"

• Solving quadratic inequalities.

**Question 1**

On the whole this question was fairly well done by the majority of students. Common errors for the Venn diagram were not putting numbers outside the circles for the set $(A \cup B \cup C)'$ or misunderstanding the universal set. Some wrote numbers in more than one area of the Venn Diagram, then continued to list repeated numbers in their answers to b – d. For the questions on the elements in the various sets, follow through marks from an incorrect Venn diagram were awarded and many students benefitted from this. Some students got mixed up with the signs for intersection

and union of sets. Some students did not realise they needed to give the number of elements in the sets for (d) and (e) and just listed the sets or added the numbers in the set instead of counting them. However, a good number of students did get these correct. Some candidates failed to answer part (d) but those who did give an answer generally gave an answer consistent with their Venn diagram.

**Question 2**

This question was proved very accessible to the candidates. The vast majority scored full marks on the first three parts of the question but then many candidates became unstuck on the last part. 'Percentage profit' was not well understood and many used the total income as a denominator (their answer to part (c)) and, as a consequence, 47.4% was a popular, but erroneous, answer.

**Question 3**

On the whole, most students gained 4 or 5 marks for parts (a) and (b) with most showing a smooth curve that went through all the correct points although a few had one or two errors. In part (c) a significant number of candidates gave the *x* value rather than the *y* value of the turning point and so failed to gain any marks.

**Question 4**

This question proved quite discriminating with a broad spread of marks achieved. Part (a) proved accessible to many students showing a basic understanding of probability. Part (b), (c) and (d) were less well answered; many candidates showed working which showed they failed to consider that these problem were essentially selection without replacement. Candidates would benefit from drawing tree diagrams in questions such as these. Part (e) was generally very well answered with most candidates able to demonstrate an understanding of calculation of mean from a list of values.

**Question 5**

This question targeted higher grades and as such a significant number of candidates scored no marks. Those candidates who knew how to apply the cosine and sine rules generally gained most marks in part s (a) and (c). Part (d) required considerably more problem solving skill and as such fewer candidates attempted this part successfully. In part (b) a number of candidates failed to correctly interpret the demand as requiring a geometric reason. Candidates who showed a simple calculation to find 115 failed to gain this mark unless they also gave the valid geometrical reason.

**Question 6**

This question provided a good opportunity for candidates to demonstrate their understanding of functions with the full range of marks achieved by candidates. Parts (a), (b) and (c) were generally well answered with many candidates gaining full marks here. Part (d) was particularly well answered with a number of candidates who failed to gain any other marks correctly answering this part of the question. Part (e) was generally answered well but a significant number of candidates misunderstood the notation and attempted to find the reciprocal rather than the inverse. The marks available for the question should have indicated that more was required. Also a number of candidates lost the final mark because they gave two values which should be excluded from the domain of $h^{-1}$. A careful read of the question would help candidates realise that only a single value

was expected. Part (f) was considerably more demanding and as such less candidates gained marks in this part of the question.

**Question 7**

Unusually this transformation question was not particularly well answered by the candidates. Virtually all candidates gained the first mark in (a) for drawing the given triangle. After this point many issues were caused by issues with matrix multiplication, seeing matrices written in the wrong order was far too common a sight and usually led to candidates gaining no further marks. In parts (b) and (c) candidates who were able to multiply the matrices successfully occasionally lost marks due to errors in the plotting of points, this was particularly evident in part (c) as one point of the triangle was coincident with a point on triangle A and this was plotted incorrectly more often than any other point. In part (d) despite the formula for the inverse of a matrix being given a significant number of candidates found the matrix **P** by considering a set of simultaneous equations. These were solved with varying degrees of success but did allow candidates to gain full marks, however they would take considerably longer than those candidates who considered the inverse of matrix **N**. In part (e) incorrect order of matrix multiplication again caused a number of candidates to lose out on marks. Again a significant number of candidates used the method of simultaneous equations to find the matrix Q. While not an efficient method it did allow candidates to gain full marks.

**Question 8**

Responses to this question varied. Few candidates picked up full or no marks and the parts of the questions where the marked were gained varied considerably from candidate to candidate. In part (a) most candidates who were successful considered the shape as a cuboid with a triangular prism on top. Due to the fact that the demand of this question was "show that" a significant number of candidates gained the correct answer from clearly incorrect working, candidates need to be aware that they will gain no marks for this. In part (b) many candidates gained full marks for correct application of the factor theorem although a small number of candidates failed to state that the result was 0 which meant they failed to secure the second mark. Candidates who used long division here failed to gain any marks. In part (c) many candidates managed to find the required values for $p$, $q$ and $r$, usually using algebraic long division. Candidates who gained an answer here often made a reasonable attempt to show that this quadratic had no solutions. While it is not required for this specification many candidates successfully used the discriminant of the quadratic for this part of the question. A small number of candidates considered that negative solutions would not satisfy the context, while this may be correct they would still be valid solutions of $f(x) = 0$.

**Question 9**

Most candidates managed to gain some marks on this question, usually the first three marks for expanding the given cubic and differentiating this. Forming and solving the required inequality proved more problematic. Many candidates were obviously attempting to solve a related equation or inequality but as they did not state the inequality failed to secure a mark for this. Quadratic inequalities are a new topic and few candidates demonstrated a proper understanding of the expected structure that the answers should conform to. This is something that candidates should be prepared for.

**Question 10**

A demanding vector question which allowed candidates to show their knowledge. Many candidates gained the first two marks in (a) for finding correct expressions for $\overrightarrow{CF}$ and $\overrightarrow{AD}$. Part (b) was a more demanding question and candidates who did make an attempt at this had a mixed degree of success. Candidates whose work was easy to follow with clear indications of what they were finding generally fared better than candidates whose work was disorganised and difficult to follow. Many candidates who did find expressions for appropriate vectors in terms of $\mu$ and $\lambda$ failed to appreciate the importance of comparing coefficients, some even attempting to divide vector expressions. Part (c) was a relatively straightforward ratio question, many candidates who gave an answer in part (b), even if incorrect managed to gain this mark. Part (e) was targeting the top grade available and as such few candidates made much of this part. Candidates who stated relevant areas did in some circumstances gain one ot two marks even without a clear strategy to gain the required area.

**Question 11**

Many candidates scored some marks on this question. The width of the rectangle and the area of the six circles each gaining a mark and both being accessible to most candidates. Many candidates also managed to use an appropriate method to find the height of the rectangle, often scoring either full or most marks in this question. A commonly seen error was to assume that the rectangle was actually a square, which usually prevented the award of marks beyond the first 2 being gained. It was also not uncommon to find candidates reverse engineer the height of the rectangle from the given answer or just state the height of the rectangle with no supporting working. Again this usually prevented candidates gaining any marks beyond the first two.

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