Examiners' Report

Principal Examiner Feedback

November 2021

Pearson Edexcel International GCSE

In Mathematics B (4MB1)

Paper 01

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Symmetry, Intersecting chord theorem

Introduction

In general, this paper was well answered by the overwhelming majority of students. Some parts of questions did prove to be quite challenging to a few students and centres would be well advised to focus some time on these areas when preparing for a future examination.

In particular, to enhance performance, centres should focus their student's attention on the following topics:

- Showing clear working particularly when it is requested in the question
- Equations of straight lines
- Probability particularly using tree diagrams
- Understanding the form of inequalities formed from a quadratic inequality.
- Upper and Lower bounds and their applications to all four operations
- Symmetry
- Calculations of values in standard form

In general, students should be encouraged to identify the number of marks available for each part of a question and allocate a proportionate amount of time to each part of the question. In addition, students should also be advised to read the demands of the question very carefully before attempting to answer. It should be pointed out that the methods identified within this report and on the mark scheme may not be the only legitimate methods for correctly solving the questions. Alternative methods, whilst not explicitly identified, earn the equivalent marks. Some students use methods which are beyond the scope of the syllabus and, where used correctly, the corresponding marks are given.

Report on Individual Questions

Question 1

Most students failed to gain any marks on what should have been a very easy first question, A number of candidates clearly did not understand the demand, many responses were seen where the candidate gave one correct response instead of all correct responses. A number of candidates also gave the number of correct responses rather than the correct responses. Instructing candidates in exam techniques would have been helpful with this question.

Question 2

The vast majority of candidates managed to gain some marks on this question, but a little over half only gained one mark. Many started well but failed to show sufficient working to secure the second mark. Candidates should be directed to past paper mark schemes for exemplification of the working that is expected in questions like this which are easily answered using a calculator.

Question 3

Approximately two thirds of candidates gained full marks on this question. Those who failed to gain full marks usually failed to find the sum of the required terms often finding both term correctly but then failing to add these.

Question 4

Generally done well. A surprisingly large number of responses to this question were blank suggesting some of these candidates did not have the correct mathematical equipment. This prevented them from accessing what should have been very straight forward question.

Question 5

The majority of candidates scored well on this question. Those whose working was more organised and systematic generally fared better than those whose working was less well structured. Failure to gain full marks occasionally came from mixing up LCM and HCF but more usually stemmed from minor numerical errors.

Question 6

Most candidates scored well on this question. Those who lost marks either showed no understanding of differentiation or failed to deal with the fractional term correctly usually with an equal split between those who differentiated the denominator and those who added one to the negative power, possibly showing weakness in their understanding of negative numbers.

Question 7

The majority of candidates answered this question well. A significant number also gave reasons for their stages in the working, which was not required. Often candidates gained full marks for gaining the correct answer but for those who failed to achieve this, their working was often impossible to follow, very few candidates only scored the method mark. Clear working may have helped some candidates here.

Question 8

A little under half the candidates gained full marks on this question. Of the remaining candidates most failed to gain any marks. In some cases it was clear that candidates did not understand the concepts of mean and media. In other the candidates failed to convert the information given into useful algebraic forms, sometimes managing to gain one mark for forming a relevant equation, but often failing to exploit this further.

Question 9

A little over half the candidates scored no marks on this question with a number of blank responses seen. An equation with a y-intercept of –2 gained one mark and should have been very accessible for any candidate with a basic knowledge of straight line graphs. Many candidates who made an attempt to find a gradient failed to gain marks due to using non-integer points which were virtually impossible to judge accurately given the limits of the graph drawn. Candidates would be well advised to use integer points to find gradients wherever possible. These can be read of more easily and reliably and also lead to simpler calculations.

Question 10

Most candidates scored at least one mark, many gaining the mark in part (a). It was disappointing that a number gave the answer as a fraction, this suggests that these candidates may well have been using their calculator without understanding what the question was asking. In part (b) candidates needed to be able to deal with addition and division in standard form without the use of a calculator. While some good working was seen other candidates showed working where they misused standard rules for manipulating numbers in standard form.

Question 11

Those candidates who had a viable method for finding an angle were usually able to determine the smallest angle and so gained full marks without requiring excessive amounts of working. Those who did find all three angles often managed this correctly but especially those using multiple different techniques ran an increased risk of errors in their working. A significant number of candidates attempted to use simple right angled triangle trigonometry on this question usually failing to gain any marks.

Question 12

This particular circle theorem seems to be a significant weakness of the candidates with over half the candidates failing to gain any marks on this question. A number had a totally incorrect statement of the theorem, with a significant minority attempting something like the tangent secant theorem. One candidate showed a proof of this theorem using similar triangles, while this is impressive it does suggest they have not been taught this as a standard result.

Question 13

As this question could be easily answered with a calculator it was essential that candidates showed clear working to gain marks. Many candidates gained one mark, usually for dealing with $\sqrt{75}$ or $\sqrt{243}$ successfully. However many then failed to show sufficient working to gain the remaining marks. It would be beneficial to candidates to study the mark schemes of these questions to see the working which is required. A significant number gave the final answer as $2\sqrt{21}$, ensuring they could not gain full marks and suggesting an over reliance on use of a calculator to manage these questions.

Question 14

This proved to be a demanding question with a little over half the candidates failing to score any marks. Generally candidates who expanded the right hand side and compared coefficients performed better than those who attempted to complete the square. In both cases there was some good algebraic working seen but often candidates scored poorly due to issues with the clarity of their working leading to errors.

Most students knew how to find a common factor from the numbers given and most of these correctly gave the Highest Common Factor as 6. Only a handful of students confused Highest Common Factor with Lowest Common Multiple (LCM). It must be noted that students were asked to 'show your working clearly' and those who gave a correct answer with no working or insufficient working did not gain the marks for this question.

Question 15

Many candidates show a complete lack of understanding of solving quadratic inequalities. Nearly two thirds of candidates successfully found the critical values, gaining at least 2 marks but only about a third of these managed to achieve the final correct answer and gain the third mark. Most of those who failed to gain the correct answer had an answer which could not possibly be the solution to any quadratic inequality. It would be a good idea for candidates to ensure they have an idea of the expected form for an answer to one of these questions.

Question 16

Most candidates gained full marks on what proved to be an accessible question for most candidates. Most often when candidates failed to gain full marks this was due to incorrectly dealing with the numerical elements of the expression or misapplication of laws of indices, both of these were more commonly seem in part (b) than in part (a).

Question 17

The vast majority of candidates scored either full or no marks on this question with slightly more scoring full marks. Most candidates who realised this was a question regarding similar triangles were able to manage the required calculations. Those who did not have a viable method to find the lengths showed a number of misconceptions many attempting trigonometric methods or assuming an additive structure.

Question 18

Another question where the majority of candidates gained either full or no marks, with around two thirds of all candidates gaining full marks. Those who failed to gain any marks often either showed no understanding of matrices or attempted to multiply two matrices.

Question 19

Candidates generally found this question accessible with nearly two thirds gaining full marks. Candidates generally showed good understanding of a suitable method. Mostly candidates who failed to gain full marks made minor arithmetic error. This often followed working which was disorganised and difficult to follow. Candidates would also benefit from checking their final answers; there was little evidence of this.

Question 20

Candidates were fairly evenly split between those who gained full marks, partial marks and no marks. Candidates who went for simpler routes to gain the final answer, finding BC first then using this to find angle ACB generally performed better than those who used a more complex route to find the final answer. A significant number of candidates had a fully correct method but failed to gain full marks as premature rounding led to a final answer that was not sufficiently accurate enough.

Question 21

The vast majority of candidates gained full marks in the first part of this questions. The second part proved to be more challenging but almost half candidates still gained full marks in this part. The main issues in part (b) were lack of understanding of rules of indices and failing to recognise that the cube root of c is the same as c to the power of 1/3 which was essential to gain any marks in this part of the question.

Question 22

A little over a third of candidates gained full marks showing a full understanding of the ratio of areas and volumes of similar shapes. The vast majority of the remaining candidates failed to gain any marks, usually failing to deal with the ratio of volumes being the cube of linear ratios within the similar shapes.

Question 23

Approximately one quarter of the candidates managed to deal with all the various complexities of this problem and gained full marks. Few candidates who made a good attempt at using bounds failed to gain full marks, however around another quarter gained one mark from making a reasonable attempt to calculate a speed in either km/h or km/min. Bounds are often a topic that candidates find challenging and this question also using mixed units proved particularly challenging.

Question 24

This question required candidates to demonstrate three different processes in dealing with algebraic fractions, adding fractions, inverting or otherwise dealing with division of a fraction and factorisation. A little under a third of candidates who gained all three method marks also gained the final accuracy mark. Often poor organisation of working meant minor errors crept in or left candidates with incompletely factorised expressions. More usually candidates scored only two of the three available method marks usually failing to gain the method mark for factorisation. It was disappointing to see a significant number of candidates who factorised $6x^2 - 4x - 16$ as $(3x + 4)(x - 2)$ or even worse $(x + 4/3)(x - 2)$. This indicate use of calculators to solve the quadratic them an attempt to use this to form a factorisation without an appreciation that factorisation and expansion are inverse processes. Candidates should be aware that this sort of working will be penalised

Question 25

Although only requiring relatively straight forward calculation the fact that several different aspects of numerical calculations need to be organised into the calculation meant that many candidates failed to gain any marks in this question. Candidates whose work was well organised and clearly labelled generally performed better. Most candidates who gained any marks scored the first three marks usually managing to calculate the profit correctly. However a significant number expressed the profit as a percentage of the income rather than as percentage of the costs. This is a error that could be easily avoided.

Question 26

The given tree diagram should have made this question more accessible but a significant number of candidate failed to fill in the diagram correctly although often they still gained marks in part (b) often following on from their errors in part (a). Around 40% of the candidates gained full marks. Those who gained only partial marks usually gained one mark for filling in three of the branches correctly and sometimes also gained one marks in part (b) for one correct product to find the probability of either win followed by loss or loss followed by win.

Question 27

This question proved to be particularly demanding with about two thirds of candidates gaining no marks. Most candidates who did gain marks managed to find the area of the hexagon, a few even managing to recall the formula for a regular hexagon. However a significant number then equated the area of the hexagon to the area of the circle instead of realising that the area of the hexagon needed to be doubled. Those who managed to equate the areas correctly generally went on to find the radius correctly.

Question 28

Another demanding question which about two thirds of candidates gained no marks on. About 40% of those who gained any marks managed to score full marks. Those gaining partial marks picked them up in a variety of ways. A significant number failed to deal with this as a selection without replacement problem but this still allowed them to gain a mark for formulating an equation. Also a number achieved a quadratic that they then gave a solution for. This would only gain marks if either a clear method was seen or the correct solution from the correct equation was achieved. Even if the result turns out to be a non-integer value it is still worth showing working, it was good that candidates realised that this shows their working must contain an error but by not showing full working candidates often lost out on a mark they may otherwise have gained.

Question 29

This question proved to be more accessible than the previous two questions with most candidates gaining some marks. Differentiating the given curve was often done correctly but many candidates failed to find the gradient for the point where x equals 2, often these candidates set the derivative to 0 finding a turning point rather than what the demand required. Candidates who did find the gradient where x equals 2 usually managed to achieve the correct answer.

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