Examiners' Report

Principal Examiner Feedback

January 2022

Pearson Edexcel International GCSE

In Mathematics B (4MB1)

Paper 01

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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
- Congruency of triangles
- Standard formula for volumes and surface areas of shapes
- Expressing algebra in index form to facilitate differentiation
- Probability particularly using tree diagrams
- Upper and Lower bounds and their applications to all four operations

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

For many candidates this was a straightforward question with much correct working seen in identifying factors. The final mark was sometimes lost where the candidate gave a multiple of the required answer or simply wrote down the Highest Common Factor

Question 2

Algebraic techniques are usually well executed and this cohort proved to be no exception. Most of the candidates gained full marks with most of the remainder achieving method marks for taking out a compound factor.

Question 3

Good substitution with the vast majority of candidates arriving at the required answer. Some candidates had issues with the handling of the signs in the numerator and it was not uncommon to see answers of the form 19/-3 or 13/-3The majority of these candidates who produced an incorrect answer picked up the mark for method.

Question 4

Generally well done with around three quarters of candidates gaining full marks. Candidate who complicated matters by introducing Pythagoras, the sine rule or the cosine rule generally fared worse than those who used the more simple direct method, often this was due to errors introduced by premature rounding. An answer of 57.7 was not uncommon and subsequently lost the final answer.

Question 5

A little under three quarters of the candidates gained full marks on this matrix question. For the remainder, it was fortunate that we only wanted to see the scalar multiples of each matrix before any subtraction. One numerical slip at this stage earned method but the final mark was then elusive to these candidates..

Question 6

The vast majority of candidates were able to gain the mark in part (a) giving the required terms of the series. In part (b) many correct answers of 36 were seen. But on around a quarter of the scripts, candidates clearly did not know what to do and many blank responses were seen. Some candidates tried to equate the given value of 103 to the sum of an arithmetic series, a consideration of the marks available should have indicated that this was significantly more complex than the correct method.

Question 7

This was the first question that saw the proportion of candidates achieving full marks drop below the half way mark. There were two issues that affected candidate's achieving full marks here. In the first instance, they had to correctly find the gradient. This proved problematic as some candidates believed that it was the increase in x divided by the increase in y. As a consequence a significant number of scripts had the incorrect gradient of 2/7. The second issue was identifying the correct equation of a straight line. Whilst the candidate used their gradient, the substituted values proved to be variable. As the y-intercept was one of the coordinates given in the questions it was disappointing to see many candidates who failed to pick up on the relevance of this and tried to use the other coordinate to find the equation.

Question 8

In over half the responses full marks were gained on this question. It is surprising how many candidates do not understand the concept of the word 'perimeter'. Many simply found the arc length and left it like that. The majority however who got this question wrong simply used area formula rather than length formula.

Question 9

Whilst this question was generally answered well with over half candidates gaining full marks, it was noticeable that most of the errors were created by either the numeric value (which invariably resulted in a final incorrect answer of x^3y^3) or no marks at all because the index powers on the numerator were added rather than multiplied.

Question 10

Much wrong working or blank answers seen, only a very small minority gained full marks here. Candidates clearly did not understand what they needed to do. Indeed, whilst some stated what was given for one mark and even fewer ventured to give that one side was common, it seemed that many had not come across congruency and seeing SAS was a rare event indeed. A small minority of candidates tried, with varying degrees of success, to use the cosine rule as a justification for the required result.

Question 11

Although answered correctly by over a third of the candidates, the downfall for many proved to be incorrectly quoted formulae. In particular, the volume of a sphere (rather than a hemisphere) proved to be a popular, but erroneous, value generated, this did still allow candidates to gain one mark for a correct expression to find the volume of the cone.

Question 12

Candidates who reduced the given expression for y to 3 terms which could be differentiated invariably arrived at the required answer. This was the anticipated method and by far the most efficient way to tackle a question like this. Unfortunately, a significant number of candidates wrote down what they believed to be a correct four term expression of $x^2 + x + 1 + x^{-1}$ which invariably led to no marks at all as this shows a fundamental misunderstanding of differentiation. Many candidates attempted to use either the quotient or product rules for differentiation. While this did allow candidates to gain full marks this required considerably more work in order to achieve and often led to errors in the candidates working.

Question 13

With no decomposition of the surds seen followed by $5\sqrt{3}$ or the required answer strongly suggested that a calculator had been used. Such candidates scored no marks as a consequence. Many candidates who did decompose correctly did not read the demand of the question correctly and, as a consequence, an answer of $5\sqrt{3}$ scoring only two out of the possible three marks, was commonly seen.

Question 14

About a third of candidates seemed to know how to tackle this question on similar solids with the vast majority of candidates setting up an initial incorrect equation or leaving the question blank altogether. Fundamentally candidates had to realise that the scale factor gained from considering the volume needed to be cube rooted. Failure to do this ensured no marks were available.

Question 15

Whilst about nearly two thirds of candidates scored well on part (a), many errors of the form mid-class values/(number of classes), frequencies/(number of classes) and even class widths x frequencies were seen. Part (b) proved to be elusive to many as there were many blank entries or incorrect values for the numerator in the probability fraction.

Question 16

Many correct calculations of the form $21250 \times \frac{104}{100}$ were seen to earn the mark for part (a). Only about a quarter of candidates were able to interpret the demand for part (b) and, as a consequence, many blank entries were seen. Besides a score of zero, a popular score was one mark where candidates identified the first step of subtracting 4000 from 22100 but then seemingly did not know what to do. A significant number of candidates restarted from $21 250, while it was possible to gain full marks most failed to factor in the interest dealt with in part (a) and so did not gain any marks.

Question 17

This question was not handled particularly well with the majority of candidates scoring no marks at all. Indeed, it was rare to see scripts gaining full marks. Of those candidates who did score any marks, the horizontal line and the circle construction proved to be the most popular responses.

Question 18

Reasonably well answered with just over half the candidates scoring full marks. Those who used the correct formula and identified the height as h or BC earned at least the first two marks. Those who simply thought that AD was the height (and there were a significant number of these), earned no marks at all.

Question 19

Candidates responses to this question generally scored either full marks or no marks with the later being slightly more common. Many of the answer given by those scoring zero marks were greater than 180, and in some cases greater than 360, candidates should be encouraged to check the reasonableness of their answers as external angles greater than 180 should be picked up as invalid.

Question 20

This question was well answered with over half the candidates gaining full marks. For those candidates who did not obtain full marks, nearly half found the correct value of *k* but then lost the final two marks, often by writing $\sqrt{\frac{1260}{28}} = 6.708...$

Question 21

A little over a half of the candidates scored no marks for considering bounds, candidates should be prepared for problems involving upper and lower bounds. Around a quarter of candidates simply gained a mark for knowing the formula for area of a triangle and substituting the values given. Recognising that the question involved dividing an upper bound by the product of two lower bounds proved elusive to the majority of candidates.

Question 22

Much good work was seen here with over two thirds of candidates scoring at least half marks. Of the errors that did occur, not factorizing the denominator (correctly) from the first fraction and/or a sign error in resolving the second fraction proved to be quite common. As all the method marks were available independently of each other it was important that candidates work was clear and easy to follow. Candidates attempting multiple steps in one line of working may well have cost themselves marks if there were minor errors in their working.

Question 23

$\frac{8}{20}$ was a common, and correct, value for the first part of the tree diagram. Candidates who appreciated that the problem was 'without replacement' invariably completed the tree diagram successfully. Unfortunately, some candidates considered the problem as 'with replacement, and denominators of 20 abounded in the second half of the tree diagram. For part (b), many candidates derived at least one correct pair of probabilities, often following through from an incorrect diagram, for one mark. But all three marks proved to be elusive to many as only two pairs of probabilities were determined, rather than three. As a consequence, $\frac{48}{95}$ proved to be a popular, but erroneous, answer. Despite all the potential pitfalls around a third of candidates managed to score full marks on this question.

Question 24

For many candidates, this proved to be a challenging question with many blank responses. Indeed, despite the requirement to 'show clear algebraic working', a small number of candidates resorted to a trial and error method thus earning no marks. Writing $M = pq$ and $N = qp$ quickly led nowhere and there were a plethora of zero scores for this question. For the very small candidates who realized that they needed to write $M = 10p + q$ and/or $N = 10q + p$ fared better and around half the candidates who started in this vein did score full marks.

Question 25

Some good work was witnessed by a significant number of candidates who realized that they needed to complete the square. Disappointingly some then resorted to using the standard formula and, as a consequence, scored at most five marks. Candidates who resorted simply to the formula only scored a maximum of two marks. Candidates should note that if a specific method is required in the demand they may gain no marks if they use an alternative method

Question 26

Although a little under two thirds of the candidate's scored no marks on this question (with many blank pages) a significant number of candidates correctly used Pythagoras to find the length of *AM* as 12 cm. The length of *AO* or *OM* was often determined correctly by these candidates and a correct calculation of the area of triangle *ABC* was seen by a significant number of these candidates. Then , the question began to unravel as many were unable to find the area of a sloping side. Significantly, a large number of such candidates made an assumption that a vertical angle of one of these triangles was 60^{o}. It was rare indeed to find any candidate who scored at least 4 marks on this question.

Question 27

Over half of all candidates scored no marks here with many blank responses seen. Just under half of the remaining candidates scored one mark for writing down $\frac{168}{x}$ or $\frac{168}{t}$ only. Of those who were able to write down an equation relating either the speeds or the times, many confused minutes with hours and many incorrect equations of the form $\frac{168}{x-2} - 12 = \frac{168}{x}$ or $\frac{168}{t+12} + 2 = \frac{168}{t}$ were seen. Also a significant number of candidates had equations with sign errors indicating a misunderstanding of the information presented in the question.

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