Pearson Edexcel

Examiners' Report

Principal Examiner Feedback

January 2023

Pearson Edexcel International GCSE

In Mathematics B (4MB1)

Paper 01R

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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
- Understanding the terminology n(A) in sets and the difference between the elements of a set and the number of elements of a set.
- Calculating estimates of means from grouped data.
- Giving reasons in angle questions, particularly focusing on the correct terminology to use with parallel lines
- Loci problems.

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 unless explicitly stated otherwise. 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

This question proved to be an accessible start to the paper with the majority of candidates gaining full marks. Incorrect answers were often out by a factor of 60 either not factoring the conversion of minutes to second or hours to minutes.

Question 2

Another highly accessible question, with most candidates showing a clear understanding of the median. Most commonly seen errors were for candidates to choose the middle number of the list, irrespective of order and to find the mean of the numbers. Given that some candidates gave this result showing no working it would be a beneficial to highlight to the candidates the appropriate use of their calculator.

Question 3

This question, along with question 6, was less well answered than the other questions in the first ten questions on this paper. Despite this the majority of responses still gained full marks. Many candidates who gained no marks gave the answer as $n + 4$ thus showing a misunderstanding of nth term as being position to term rather than term to term. Some of the other candidates who failed to score on this quoted the arithmetic series formula often making no attempt to use this or erroneously attempting to find the sum of the series. Formal treatment of the arithmetic series is not a requirement of this specification and while it may occasionally prove helpful with questions like this many candidates seemed to be unaware how to apply the formula to a simple sequence.

Question 4

Another highly accessible question which showed that candidates had the ability to manipulate indices well. The most commonly seen error was to fail to deal with the 125 often giving a final answer as $125a^6$. This still gained these candidates 1 mark.

Question 5

A simple differentiation question which saw the majority of candidates gain full marks with a fully correct response. Of those who failed to give a full correct response around two thirds of these candidates gave one term differentiated correctly, usually the $21x^2$ but on a few occasions the other term and so gained 1 mark.

Question 6

As previously mentioned overall candidates found this more challenging than most of the other early questions, but it was still the case that most candidates gained full marks. Many candidates failed to realise that giving the number in prime factor form would actually be helpful with a significant number working out the values of A and B or $2A$ and $7B$. Because these numbers are quite large candidates then often failed to make significant progress from this start. A fair number of those who failed to gain full marks also found the LCM of A and B rather than $2A$ and $7B$ as demanded in the question. They were still able to gain one mark from this.

Question 7

Generally a well answered question, it is obvious that, in general, candidates are aware of what is expected to be seen in terms of working for this type of question and the majority of candidates gained full marks. Despite this there were a number of candidates who failed to show sufficient working, usually related to ensuring there was evidence of converting to common denominators before adding the two fractions. Also a small but significant minority of candidates failed to heed the demand of the question to give their final answer as a mixed number, thus losing the final mark.

Question 8

Another highly accessible question where the majority of candidates gained full marks. Those who failed to give a correct response usually failed to gain any marks. While similar ideas have been tested in ratio questions in the past this is not a standard question with standard working and as such many candidates produced working that was difficult to follow. Candidates who performed well on this question generally showed more organised working. It is beneficial for candidates to signpost their work, stating what they are attempting to find and to show all calculations they are undertaking. In this way method marks can be awarded easily by the examiners. If the candidates work is unclear it may not be possible to attribute method marks unless correct results of calculations are seen,

Question 9

This question was generally answered well with the majority of candidates gaining full marks but a significant number failed to heed the demand which included the phrase “Show clear algebraic working”. This should act as a warning to candidates that method which rely on calculator technology will not gain marks. Most candidates expanded the given equation to produce a correct three term quadratic. Those who then went on to solve this showing their working gained full marks. Those who failed to show their method to solve their quadratic trinomial only gained 1 mark for a correct trinomial. Candidates who realised you could use the format in which the question was given as you would from completing the square generally fared well as they had a less complicated route to their answer. A number however failed to consider both the positive and negative square roots thus losing the final two marks.

Question 10

This question allowed most candidates to show their ability to manipulate algebraic fraction very well and the majority of candidates gained full marks. Those who made mistakes often omitted the x on the denominator or made an error in the power, x^2 was seen on a few occasions. These candidates often gained 2 marks for this.

Question 11

Bounds questions like this often prove difficult for the candidates due to the fact that to find a lower bound in this case requires the use of 2 upper bounds. It was therefore pleasing to see that just over half gained full marks on this question. Candidates who failed to gain full marks usually showed an appreciation of bounds but failed to use the correct combination of lower and upper bounds to find the lower bound required, this gained these candidates one mark. A similar number failed to consider the proper bounds in all cases (the first mark only required one bound to be correctly considered), the most usual example of this was when candidates used 20.5 (or even 19.5) for y. Using 20.5 still allowed these candidates to gain 2 marks.

Question 12

Around two thirds of candidates gained full marks on this question, this is obviously a topic which is well understood and which candidates are well prepared for. For those failing to secure full marks the most common errors were based around trying to use an incorrect proportionality relationship the most common being *M* inversely proportional to *p* (omitting the cube) or *M* being directly proportional to the cube of *p*. Unfortunately in both cases the candidate would score no marks.

Question 13

This was the question that candidates performed best on with nearly 90% of candidates gaining full marks on this. Those who did not gain full marks often gained the correct final answer but had not heeded the demand to "Show clear algebraic working". Candidates must ensure that they show complete methods with no missing steps when they see this demand in a question. Failure to do so will see them losing marks.

Question 14

Another very accessible question which the majority of candidates scored well on. The most commonly seen errors were to consider 5cm as the radius rather than the diameter of the semi-circular cut-outs or to consider the square subtract 2 full circles. A small number of candidates gained a numerical answer with either no working at all seen or just formulae quoted without number being substituted in. Candidates should note that they will only gain credit for method marks if they show the values they use in formulae, especially in a problem like this where one of the key measurements (the radius of the circle) is not given in the question.

Question 15

A standard question on linear simultaneous equations which candidates seem to be well prepared for with the majority gaining full marks. Responses which failed to achieve this mostly fell into three categories. Firstly candidates who had the correct method but made a numerical slip (usually early on in the process). These candidates usually gained 2 marks for the correct method. Secondly many candidates showed the initial working which led to a first correct variable but failed to show their method for gaining their second variable, these candidates also gained 2 marks. Thirdly candidates who had fundamental errors in their working. It was disappointing to see that in many cases these candidates gain correct answers (presumably from use of calculator technology) even if this contradicted the values achieved from their working. These candidates gained no marks. Candidates need to be aware their working will be checked and more credit will be giving from an incorrect answer following a minor error in working than a correct answer from incorrect working.

Question 16

A fairly straightforward area question involving a little problem solving and some right angled trigonometry which most candidates performed well on. Most candidates realised the need to find the height of the trapezium although in some cases their working was not clear that this is what they were finding which would prevent them gaining any method marks unless they found the correct height. Most candidates used the expected straightforward application of trigonometry to a right triangle to find the heights but a few more complex methods, usually using a sine rule were seen. This did occasionally lead to rounding errors which lost the candidates the final accuracy mark.

Question 17

This question proved more challenging for candidates than the preceding questions and showed a range of different common misunderstandings quite clearly. Apart from candidates failing to deal with the mix of unions and intersections and complements seen in the question which generally showed as either an isolated error (usually on part (d)) or answers which were difficult to attribute any method to two common issues did stand out. A number of candidates failed to understand that the numbers show represented elements in the region and treated these as elements in their own right. This was acknowledged in the mark scheme by allowing these candidates to still gain up to 2 marks. Unfortunately some candidates took this a step further and failed to count the number of elements and gave a list of elements despite the demand of each part being of the form find n(…). This showed too much of a misunderstanding to gain any marks.

Question 18

Despite being a question targeting a difficult topic, rearranging equations this was very well answered with over two-thirds of candidates gaining full marks. Very few candidates showed no understanding of the process to rearrange the equation and most candidates who failed to gain full marks did manage to make some headway and gained some marks.

Question 19

A fairly straightforward angle question which showed most candidates gain the three marks available for finding the correct value of angle *DEF*. Candidates were generally less successful at securing the remaining two marks which were awarded for giving reasons for the stages used. Where candidates did attempt this they were often not detailed enough. The fact that two lines are parallel will never be sufficient for a reasoning mark, candidates need to use the appropriate terminology, alternate, corresponding or allied/ co-interior angles. They also need to state how these are used and state the angles involved eg "GAB=ADC=106 because they are corresponding angles which must be equal." When considering the angles in the triangle DEF is was not sufficient to state merely that the angles in a triangle totalled 180, the fact that the triangle was isosceles needed to be stated.

Question 20

Despite being a fairly straightforward question a number of candidates left this question blank. This suggests they may have lacked the correct equipment to complete the question. Of those candidates who did attempt this question the majority gained at least 3 marks. Generally part (a) was correct. Part (b) occasionally showed a correct bisector but with no visible construction lines, this could only gain 1 marks, it is important that construction lines are clear enough to be seen. Part (c) was a little unusual and saw some candidates try to find point s 3cm from B and 3 cm from C rather than draw a line parallel to BC. Candidates who had reasonable attempts at part (a) to (c) were usually able to gain the final mark in part (d) also by shading the required area. It was unusual to see good constructions followed by an incorrect area shaded.

Question 21

Despite being a demanding topic this question saw the majority of candidates gain full marks. In part (a) a number of candidates failed to gain any marks as they did not use the factor theorem as the demand required. Candidates need to be aware that where a particular result or technique is required alternate methods will gain no marks. Other who lost marks on this part generally did so because they failed to show that they were using f(-2)=0 explicitly with the "=0" needed to be inferred from their result. As the demand of the question was "Show that" this would not be condoned. Those who used k=53 and tried to confirm this led to a result of zero could gain full marks but needed some conclusion after demonstrating that f(-2) = 0 was indeed correct.

Part (b) was more demanding and **candidatQuestiones** found this more difficult. It would be worth confirming with candidates that usually working would be required for a question like this but due to the demand of the question and relatively simple factors a fully correct answer in this case was awarded full marks even if full working was not apparent. The minimum working we would expect to see is a factorisation of the cubic into (x+2) Q(x) where Q(x) is a quadratic. Then seeing the quadratic factorised into two linear factors. With current calculator technology is it feasible to solve a cubic equation, candidates relying on this often failed to gain marks as they often failed to realise that three brackets of the form (x-a)(x-b)(x-c) where a,b and c are the roots would not expand correctly to gain the given cubic.

Question 22

Part (a) was relatively straightforward and about three quarters of the candidates gained full marks in this part. Part (b) was considerably more demanding but still saw nearly half candidates gain full marks. Most candidates proceeded by finding the matrix BC then considering the determinant. The first part was often completed correctly or with only a minor error. The determinant proved more difficult, with many instances where the candidate confused the determinant with the inverse of the matrix seen, so candidates would use the reciprocal of the determinant or even attempt to equate their inverse matrix to 20. These candidates were limited to only gain the first 2 marks in this question.

Question 23

Despite testing some very demanding material this question showed just over half the candidates gain full marks. Part (a) was almost always correct although occasional incorrect answers of 0 or 1 were seen. Part (b) was generally less well attempted. Those candidates who did make some progress generally managed to gain the correct answers although a number of candidates gained both answers then rejected the negative answer erroneously losing the final mark. Candidates who failed to make progress generally failed to appreciate the significance of the base when considering equation with indices like these.

Question 24

A demanding question which saw the majority of candidates gain no more than 1 mark. Many candidates realised the importance of finding the height of the pyramid given the volume but a significant number used the incorrect formula for the height of the pyramid, limiting the marks they were able to access. Candidates then needed to find the three edges CE, CX and EX. Some candidates managed to gain a mark for this even without the height as CX did not require the height and the second available method mark for this was awarded even if an incorrect height was used. A number of candidates then failed to use the length they had found correctly, often incorrectly assuming either that a right triangle could be used or that CEX = CEM + MEX where M was the mid-point of the base of the triangle.

Question 25

A demanding vector question which showed candidates gaining a spread of all the available marks. Most candidates faired well with part (a) with the majority of candidates gaining full marks and a significant number gaining 2 marks as they had a minor sign error in their working. Part (b) proved more difficult for the candidates to access with a significant number of blank responses seen. Many candidates failed to realise they would need to find a vector involving P using 2 fundamentally different routes. AP and BP were the obvious choices and the ones most often attempted. Often candidates considered a route using either AB or CM, which would gain them a mark but far fewer considered both routes which would allow them to find the vector they were aiming for and hence find the required ratio. Non-vector methods were rarely seen, often fundamentally flawed and would not gain marks due to the demand of the question.

Question 26

Parts (a) and (b) of this question were not directly connected and the responses showed that candidates were much better prepared for part (a) than for part (b). Part (a) showed the majority of candidates gain full marks. The most common issues seen in part (a) included candidates using the class width (or even half the class width) rather than the mid-point for the value of a class, this prevented these candidates gaining any marks. Otherwise part (a) was usually attempted well with minor arithmetic errors preventing full marks being gained.

Part (b) was much less well answered with a significant number of candidates gaining no marks and many of these being left blank. Candidates often failed to realise the fact that frequency links to area rather than height in histograms and gave erroneous answers based on the assumption the bars could be read like a bar chart. This led to non-integer frequencies which should indicate to candidates that they have an error in their methodology. Also the scale of the graph was often erroneously assumed to be 2cm to 1 frequency density. It is usual that establishing the correct scale is a key part of a histogram question and so candidates should be expecting this.

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