Examiners' Report

Principal Examiner Feedback

Summer 2017

Pearson Edexcel International GCSE

In Mathematics B (4MB0) 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 students for future examinations.
Areas were candidates showed particular strengths included most aspects of algebra, differentiation, matrix manipulation and vector manipulation.
In particular, to enhance performance, centres should focus their students' attention on the following topics, ensuring that they read examination questions very carefully and answer the question which is set – not the question that they think is set.

- Rounding to significant figures (Qu 1)
- Displaying inequalities on a number line. (Qu 6)
- Drawing tangent to approximate instantaneous rate of change (Qu 9)
- Types of numbers (Qu 11)
- Probability (Qu 14)
- Scale factors of area and volume of similar shapes (Qu 15)
- Factorising difference of two squares (Qu 16)
- Converting decimal parts of an hour to minutes (Qu 17(a))
- Calculating average speed (Qu 17(b))
- Bearings (Qu 26)
- Constructions and loci in 2 dimensions (Qu 27)
- Mensuration of a cone (Qu 29)

More generally 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. Where answers are given candidates should ensure their working has no gaps
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

This proved to be a very accessible question for most candidates with approximately two thirds of candidates scoring full marks. Of those who did not gain full marks more gained marks in part (b) than part (a) showing a better understanding of rounding to decimal places than significant figures.

Question 2

Another good chance for candidates to gain marks early on, approximately 75% of candidates scored full marks on this. A small number of candidates failed to give their final answer in standard form and so only gained one of the possible two marks.

Question 3

Over 95% of candidates scored full marks on this question. It is pleasing that such an important skill is obviously well practised by candidates taking this paper.

Question 4

This question was very well answered with over 85% of candidates scoring full marks. Those who failed to gain full marks usually either found the percentage of matches won or found the angle of the sector for the 16 matches lost.

Question 5

A little over 75% of candidates scored full marks on this question. Those who lost marks on this question generally either divided by the final weight rather than the initial weight or gave the their final answer as a negative value losing the final mark.

Question 6

Most candidates gained the first two marks in this question, a little under 90% gaining 2 or 3 marks. However the final mark in part (b) proved to be much more discriminating, only about 35% of these candidates gained this mark. Many made a reasonable attempt but this was specifically for showing the standard way of showing an interval on a number line which candidates should be familiar with.

Question 7

A little over half the candidates scored full marks on this question. Of the remaining candidates about a half scored no marks with responses that had no merit, common examples include candidates who gave a matrix which had the reciprocal or negative of each element. Those who had a partially correct attempt usually either managed the matrix aspect of the inverse or calculated a correct determinant, each being seen with about the same frequency.

Question 8

Very few candidates scored anything other than zero or three on this question with each accounting for approximately half the candidates. As the final answer was given candidates needed to show full working to gain credit for this and many failed to show sufficient working of their surd manipulation.

Question 9

The vast majority of candidates failed to show an understanding of how to calculate an instantaneous speed given a curved distance time graph. Nearly 95% of candidates gained zero marks. Of those who did realise that drawing a tangent was necessary the vast majority went on to score full marks.

Question 10

Approximately 55% of candidates scored full marks on this question. The vast majority managed to score a mark for calculating the shaded area. Where some lost out was expressing $(2r)^2$ as $2r^2$. From this point onward the only commonly seen errors were finding the area as a percentage of the area of the circle or failing to realise that the r in the candidates expressions would cancel.

Question 11

Disappointingly over 60% of candidates failed to gain any marks on this question. Knowledge of the standard types of numbers and how they relate to each other should be a relatively low demand question. Many candidates further compounded issues by listing the elements in multiple areas on the diagram ensuring they scored no marks for this part of the question.

Question 12

Approximately two thirds of candidates scored full marks on this question, showing that matrix multiplication is a well practised skill. Of the remaining candidates approximately a half lost one mark due to slip in their arithmetic with the vast majority of the remainder scoring zero as their work showed a fundamental lack of understanding of the mechanics of matrix multiplication.

Question 13

This question showed a good level of understanding of set notation, the majority of candidates scoring something on this question. Parts (a) and (b) were answered significantly better than part (c) but (a) and (b) were answered with a similar level of success, three sets is not being seen as a problem for the majority of candidates. Many of the incorrect answers showed the candidates mistaking union for intersection and vice-versa.

Question 14

The responses to this question were quite variable although the final scores were most often either zero or three. A significant minority of the candidates drew a tree diagram, while not required this often led to a good solution. Candidates often gained one or other of the possibilities correctly either the selection with replacement or selection without replacement, but about one quarter of these candidates only scored the first mark as they misunderstood the question and attempted both possibilities in the same way. A small number of candidates calculated the probability of gaining two discs the same colour, as this could be used towards they calculation of the final answer they did score one mark for this.

Question 15

This question presented a significant challenge to candidates with approximately 65% gaining zero marks. Many of these candidates failed to adjust for the difference in scale factors between area and volume and gave their answer as 1215 cm^2. Of those who gained any credit for this question the vast majority went on to score full marks.

Question 16

In common with other algebraic questions, this question allowed the candidates to demonstrate their skills in this area, approximately 55% of candidates scored full marks on this question. The majority of candidates managed to factorise the numerator, but a significant number factorised out 4 as a common factor on the denominator and then failed to factorise $x^2 - 1$ scoring only one mark for the question.

Question 17

This question presented a range of challenges to the candidates with a little under 25% scoring full marks. The majority of candidates scored one mark in part (a) for calculating the time correctly but a disappointing number of candidates reported 1.25 hours as 1 hour 25 minutes, working with time should be something that all candidates should be well practised at this level. In part (b) the requirement to calculate the average speed was often interpreted as calculating a numerical average of the speeds given which would only be valid if each stage were of equal duration. Candidates should be reminded that average speed requires a total distance and a total time. Some candidates who attempted this made mistakes due to the mixed units given for the time taken.

Question 18

As a standard question this was very well attempted by the candidates with approximately 80% gaining full marks. Of the remaining candidates the majority had a correct methodology, usually elimination or substitution and most managed to gain at least two marks.

Question 19

The vast majority of candidates showed a correct method for this question. Unfortunately only around 45% scores full marks. The most common issues were inappropriate premature rounding, often AC =7.8cm was seen rather than 7.77cm. This was often exacerbated by candidates using unnecessarily complex methodologies. While full marks are available the candidates should ensure they maintain accuracy throughout and additional stages require even higher levels than using the most efficient method.

Question 20

Despite several complications this question saw around 55% gaining full marks. The vast majority of candidates successfully differentiated x^2 however the second term $\frac{16}{x}$

proved more demanding. Most candidates who managed this showed the expression written as $16x^{-1}$ prior to differentiation which is to be encouraged. In part (b) candidates often gained a mark for equating their answer to part (a) to zero even if this expression were incorrect. Of those with a correct equation a number now struggled either to isolate x^3 or in a few cases to cube root 8 successfully.

Question 21

Setting what amounted to a pair of linked linear equations in vector form caused few problems to the candidates with approximately two thirds gaining full marks. Those who managed to work through the vector aspect of the question but failed to gain full marks usually failed to deal with the signs correctly, particularly the double negative embedded within the first component of the vector equation.

Question 22

The majority of candidates scored either full marks or zero on this question. Those who were able to work with the angles generally managed to get to the final answer. A surprising number of candidates worked with the interior angles, making the calculations much more awkward, working with exterior angles in questions like this should be encourages.

Question 23

Part (a) of this question was very straightforward, over 90% of candidates managed to answer this correctly. Part (b) proved to be considerably more challenging with just a little under 50% of candidates scoring full marks here. Relatively few candidates who formed a correct equation failed to gain full marks. The most common errors were equating *r* th term of sequence S to 46 time *r* th term of sequence T or equating one of the *r* th terms to 46.

Question 24

A little over half the candidates scored full marks on this question. In part (a) candidates generally understood that probabilities should sum to 1 but a small number divided by 6, or even 5, at some stage, obviously trying to use equally likely outcomes. A significant minority of candidates found probabilities over 1 which should have highlighted that they had made a mistake. Candidates who managed part (a) generally scored well in parts (b) and (c), whereas those who had issues with part (a) often failed to score on (b) and (c) as well.

Question 25

In part (a) a little over 90% of candidates scored full marks. The only commonly seen error was to equate f(x) to 2.5 then solve the equation. In part (b) approximately 60% of candidates scored full marks. The most common errors seen were misinterpreting $f^{-1}(x)$ as the reciprocal rather than the inverse or mixing up x and y in working, usually seen as only exchanging some of the x for y in their working.

Question 26

Given that the individual parts of the questions were each 1 or 2 marks should have alerted candidates that methods involving the cosine rule or sine rule were unlikely to be appropriate. Despite that many of these were seen. Successful candidates made use of the parallel North lines in part (a). Very few who had a viable method failed to gain the correct answer. Candidates who did not find the correct answer in part (a) were not able to access the mark in part (b) and this was the part were inappropriately complex methods were most often seen. Candidates should be taught to use mark allocation to inform their judgement and avoid wasting time. Very few candidates who failed to gain marks in part (a) scored marks in part (c) as it required use of similar methodologies.

Question 27

A large number of otherwise very good candidates failed to score on this question. It is essential that candidates have access to appropriate tools to complete this question. Of those who made reasonable attempts at this a small number obviously tried to measure rather than construct the required lines and this invariably led to no marks for the construction. Of the two standard constructions required the perpendicular bisector was generally more accurate than the angle bisector, the main issue with that was a number of candidates constructed the bisector of AB rather than AC. One commonly seen problem with the angle bisector was inappropriately small radius arcs used in the construction; this often led to the loss of the accuracy marks. In part (b) candidates usually scored the mark for drawing an arc of 5 cm centred at B but the shading was more sporadic, showing quite clearly that some candidates misunderstood the description of the area.

Question 28

Despite being a very challenging question roughly 20% of candidates scored full marks. A little over half the candidates failed to make any headway with this question. Many of these responses did not include x in lengths and failed to appreciate that an x^3 would be required in a volume expression. Candidates who compared arc length to circumference generally were more successful finding the radius than those who compared areas or used more complex methodologies. Given an answer for the radius some candidates managed to gain a mark for the height using Pythagoras, even with an incorrect radius. Very few candidates made any headway with part (c) unless they had reasonable answers for parts (a) and (b).

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