Examiners' Report
Principal Examiner Feedback

November 2024

Pearson Edexcel International GCSE
In Mathematics B (4MB1) Paper 01

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Introduction

In general, this paper was well answered by the majority of students. Some parts of the paper did prove to be quite challenging to some students, such as the ratio of $C : D$ on question 12, the use of circle theorems on question 20, and the more challenging questions 25, 26 and 27.

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

- Showing clear working, particularly when it is requested in the question e.g. question 21, question 23, question 24, question 25 and question 27
- Annotate diagrams as these are often marked e.g. question 16 and question 20
- Make sure they have appropriate equipment for a Mathematics examination e.g. for question 3
- Focus their student's attention on the following topics
    - Circle theorems
    - Upper and lower bounds
    - Shapes with similar area and volume

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

The majority of students scored full marks on this algebra question. Those that did not gain the marks invariably were awarded 1 mark for a partial factorisation or an answer in the form $7b(xa + y)$

Question 2

Students fared better on part (b) than on part (a) as the phrase 'rotational symmetry of order 2' proved to be quite problematic. Even though both parts of the question asked for one more square to be shaded, too many students shaded more than one square on the diagrams and spoilt an otherwise correct answer and so lost the marks available.

Question 3

It was pleasing to see so many students correctly used their pair of compasses to draw a reasonably accurate bisector. Fortunately, the mark scheme overlay allowed for a level of tolerance on student's bisector (a significant number of students bisectors proved to be very close to the edge of the tolerance allowed). Too many students drew a correct bisector without arcs or a correct bisector with only one pair of arcs and so was only awarded B1.

Question 4

A variety of approaches were seen in this question. Students that drew a correct diagram usually went on to score both marks. The most common incorrect answer seen was 084° which came from doing 360° – 276° but then failed to realise that this needed to be subtracted from 180° to give the bearing of B from A.

Question 5

Many students scored full marks on this algebra question. Those that did not often scored M1 as they were able to form a correct equation in the form $ax = b$ A few students made silly numerical errors and so lost unnecessary marks.

Question 6

Many students were able to give 2 correct terms written in a product and so scored M1, often this was $2^2 \times 3^2$. However, too many students gave answers that contained an incorrect term e.g. $2^2 \times 3^2 \times 5$

Question 7

Many students scored full marks for finding the expected number of times the dice will land on a number greater than 3. For those that did not score full marks many scored 1 for finding either the probability greater than 3 (0.42) or for multiplying a probability by 300. A few students spoilt a correct answer by giving their final answer as a probability out of 300 $\left(\frac{126}{300}\right)$ which is not the expected number of times.

Question 8

Most students were able to gain the 1st M mark as they were able to show a correct first to solve this problem. Often this was for finding the cost of 1 kg of onions. Once found many students went on to gain the second M mark as they could show a correct method to find the cost of potatoes. Often this was for finding 1 kg of potatoes. A common error here was to subtract the cost of 2 kg of potatoes and not divide by 5. It was surprising to see that a few students, after finding correct figures, went on to make arithmetic errors e.g. after writing 1.71 + 3.36, an incorrect answer was then seen.

Question 9

Many students were able to score full marks, as they were able to correctly calculate the total area of the cuboid. The most common errors seen included either finding the correct area for all 3 rectangle and not multiplying by 2 e.g. 12 × 5.5 + 12 × 6 + 5.5 × 6 = 171 or finding the area of 2 of the rectangles and assuming that there were 4 of these e.g. 12 × 6 × 4 + 5 × 6.5 × 2 = 354. A few students either calculated the volume of the cuboid or worked out the perimeter of each rectangle and added these together.

Question 10

Many students were able show a correct method to find the gradient of L_1. However, a few students failed to realise that the gradient was negative so an incorrect gradient of 2 was seen. Some students calculated an incorrect gradient as they used one point from the line L_1, usually (1, 0) and the given point (–9, 12) which lied on L_2 and so a common incorrect answer was $-\frac{6}{5}$. The next mark was for substituting $x = -9$ and $y = 12$ into an equation of a line and many students were able to do this as the mark scheme allowed for following through their gradient. Common errors included mixing up the x and the y coordinates, so effectively using (12, –9) rather than (–9, 12). A few students incorrect found a line that was perpendicular to L_1 rather than parallel to L_1 and this was costly as the mark scheme only allowed follow through on the gradient of L_1. A small minority of students lost the final mark as they gave an answer that did not include y = …, which was a requirement for the final mark.

Question 11
A variety of different answers were seen for this question. Many students gave a correct answer of 5×10^{-4} and so scored both marks. Some students gave a correct answer not in standard form e.g. 0.0005 or 0.5×10^{-3} and so scored M1. However, there were far too many incorrect answers e.g 6.9×10^{231} (which came from multiplying the 2 numbers rather than dividing the two numbers) that scored 0 marks.

Question 12
There were 2 main approaches that students could take to answer this question, either a ratio approach or a fractional approach. Both were seen with approximately the same level of success. Those students that took a ratio approach, were often able to find a correct ratio of *B* : *D* or *A* : *C* and so scored the 1st M1. Many students were able to go on to find a correct ratio combining *B*, *C* and *D* or *A*, *C* and *D* and so scored 2nd M1. Once this was achieved many students went on to give a final correct answer. Those that took a fractional approach, usually went straight for a correct method to find $\frac{C}{D}$ or $\frac{D}{C}$. For those students that did not then M1 was often awarded for 2 correct fractions multiplied together. In both cases, occasionally the final answer was not given in its simplest form and so A1 was not awarded.

Question 13
The key to answering this question involved understanding the phrase ‘angle of elevation’ and which angle this referred to in the question and this seemed to cause some students a problem. Those students that had correctly interpreted the angle required often went on to score full marks. However, too many students did not identify the required angle and so limited the number of marks available. These students often scored 1 mark as they added 1.7 to a side length that had come from an incorrect trigonometric statement.

Question 14
Generally, this question was answered well by many students. Most were able to write the expression with a common denominator. However, a few students seemed to just ignore the denominator. Many students were able to expand the numerator of the expression. The most common error seen resulted in arithmetic slips, $20x-20-28x-70$ was often an incorrect expansion (failing to realise that 2 negatives make a positive). Some students lost the final mark as did not give their answer in its simplest form, $\frac{50-8x}{28}$ was the most common answer which scored 2 from the 3 marks available. A few students took the alternative approach of expanding and then simplifying. Those students that took this approach were usually successful in scoring full marks.

Question 15
This question proved difficult for some students. Those that scored marks often did so as they showed a correct method to find the total points after 12 games or after 14 games. Some students found both and then made no further progress. Some students were able to find the total points scored in games 13 and 14, but

then the ratio aspect of this question caused the biggest problem. Often an incorrect ratio was used or when a correct ratio was used this was used on an incorrect total e.g. $1372\times\frac{3}{5}$

Question 16

Students generally scored well in this question. Many scored 3 marks as they correctly found angle *CBG* = 66°. Those who did not score 3 marks often scored the first M mark as they found one of the required angles. This was often awarded for angles marked on the diagram as students angle notation was often poor. Even though the mark scheme only required one correct reason for their stated method, too many students gave no reasons or reasons that did not include the underlined words given in the mark scheme e.g. ‘straight line’ would not score this mark as the mark scheme required angles and line for a reason that angles on a straight line add to 180°. Students should be encouraged to give all their reasons when answering this type of question.

Question 17

Overall, this question proved to be challenging for many students. Those that understood what the question required often scored the 1st two marks as they used a correct method to find the value in 2014 followed by a correct method to find the value in 2016. So, answers of 14260 and 13946.28 were often seen. Some students did not gain the 2nd M mark as they calculated a value for 2016 based on 2012 rather than 2016. Some thought that a decrease of 2.2% used a multiplier of 0.898 rather than 0.978, which comes from combing the multipliers together. Finding the multiplier for the final change caused students the most difficulty and a range of incorrect methods were seen. Those that knew what was required often scored full marks, but some students had a correct method and then failed to multiply by 100 so lost the final A mark. A common incorrect answer seen included $\left(\frac{13946.28-13137.40}{1313740}\right)\times 100$, which obviously uses an incorrect denominator.

Question 18

Many students scored well in this algebra question, with many fully correct solutions seen. The vast majority scored the 1st M mark as they recognised that the 1st step required was to remove the square root. The 2nd M mark was often awarded for multiplying by the denominator and expanding correctly to form a correct equation. Those that did not score this mark usually made arithmetic errors when multiplying out the brackets. Again, the 3rd mark was often awarded for gathering the terms in *t* on one side and the other terms on the other side of an equation. Those that did not score this mark usually made errors when rearranging (often sign errors) their equation.

Question 19

For those students who understood matrix multiplication part (a) of this question proved to be an easy 2 marks. However, too many students made arithmetic errors in their calculations and so often only had 2 or 3 correct elements and so lost an unnecessary mark. The most common error seen was $\begin{pmatrix} 6 & -3 \\ 0 & 6 \end{pmatrix}$ which came from multiply the individual elements e.g. 2×3 rather than $2\times 3+1\times 0$

Again, in part (b), for those students who understood that an inverse matrix was required 2 marks were often scored. Some students scored M1 only as they either failed to find a denominator or like part (a), made arithmetic errors in their calculations.

Question 20

Many students were able to identify a correct angle so scored the first B1. The key to this question involved finding angle *ABC* and here students fell into 2 camps, those that could and those that could not. For those that could often went on to score full marks. Those that could not often made no further progress in this question. A common error was to think that angle *ACE* was 61° not 63° and this often resulted in the final A mark being withheld as we did not follow through any of the angles given for the B1.

Question 21

As this question involved bounds, it was surprising to see that some students simply substituted the given values into the given formula. In this case no marks were awarded. Many students scored the first mark as they were able to identify one correct bound, usually the upper or lower bound for *v* probably because it asked for 25.4 to 1 decimal place. Those students that identified all 3 bounds needed often scored full marks. However, many students used one or more incorrect bounds and so lost marks. Most common incorrect bound seen was for *s*, probably because it asked for 15 to the nearest 5, too many students though this had a lower bound of 10 and/or an upper bound of 20

Question 22

This question was generally answered well, with many students scoring at least 3 marks. Part (a) saw a range of representations and whilst many correct representations were seen, too many students lost marks for either not using a open or a closed circle or having these the wrong way round. Students should be aware that we required a single line between –5 and 3, too many drew 2 lines or had a line/lines that extended past the limits required and so lost marks.

This algebra part of the question was answered well with many students scoring all 3 marks. Whilst the mark scheme allowed for the incorrect use of the inequality symbol, which allowed students to score the method marks, students should be encouraged to use the correct inequality symbol in these types of questions. Other errors included arithmetic errors when either expanding the bracket or isolating the *x* terms.

Question 23

In part (a) many students were able to use the factor theorem to show that $(x + 5)$ was a factor of the given cubic. Most substituted –5 into the cubic and set = 0 with no errors. A small minority made an error in their substitution and so the final mark was withheld. The most common error seen included use of algebraic division to show that the remainder was 0. It is worth emphasising that this is not use of the factor theorem and so no credit was given for this.

Part (b) asked students to show clear algebraic working, so a correct answer with no working scored 0 marks. Many students were able to use algebraic division to find the required quadratic. Occasionally arithmetic errors were seen. Once the required quadratic was found students were well rehearsed in factorising the quadratic to obtain the 3 required factors. A common error seen included an answer of $(x+5)(x-2)\left(x+\frac{3}{2}\right)$.

Some students lost the final mark as they went on to solve the cubic and a final answer of $x = -5$, $x = 2$ and $x = -\frac{3}{2}$ scored A0

Question 24

In part (a) many students were able to use the given information to complete the tree diagram. Those that did not score both marks often scored 1 mark as they correctly placed 2 probabilities in the correct place.

Part (b) caused students more issues than part (a). Many scored 1 mark as they showed one correct product. However, a few students thought that when following the branches they needed to add rather than multiply the probabilities. As 0.68 + 0.71 gave a probability greater than 1, students should have realised they were doing the wrong thing. The key to answering this question was to recognise that the probability of taking the bus on exactly one day was required. Many students failed to do this and either one of the two required probabilities was found, or incorrect probabilities was found. Those students that found the two required probabilities often went on to make a correct conclusion.

Question 25

The first 5 marks in this question proved accessible to many students. Many students were able to correctly substitute the linear equation into the quadratic to form an unsimplified equation in terms of *x*. Very few students tried to form an equation in terms of *y* and this was probably a wise choice as the question became more complicated if this approach was taken. Many students went on to form a correct 3 term quadratic. A few made numerical errors, but the mark scheme allowed this mark for 2 of the 3 terms correct so very few students were penalised at this point. The next mark was usually implied by having $x = 4$ and –7.5. It is worth noting that working should be shown for these values, as an incorrect 3 term quadratic would have required working for this mark to be awarded. The next mark was again, usually awarded for $y = 77$ or $y = 13.75$. It is worth noting that working should be shown for these values, as incorrect *x* values would require working to be shown for corresponding *y* values. Once these values were found the next mark usually followed. The next 2 marks proved problematic for students and a variety of approaches were taken, some more time-consuming than others. For many students they made no further progress with is question. Whilst the mark scheme allowed the use of alternative methods the most efficient method simply used finding the area of the required triangle using $\frac{1}{2}ab \times h$. Other methods seen, whilst more time-consuming, were also more likely for errors to occur.

Question 26

This question proved to be problematic for students and was quite often left blank (especially part (b)). Those that attempted this question had more success in part (a) than in part (b). In part (a) those students that took a Pythagoras' approach usually did so without error. Those that took a trigonometric approach usually gave a correct method, but this was more time-consuming and much more prone to errors.

For those that attempted part (b) a range of marks were seen. Some students were able to find the base area of P or wrote a correct expression to find the length of *EB* and so scored 1 mark. However, only the better students recognised that both of these were required to answer the question. The key to answering this question required an understanding of mathematically similar figures. Here you needed to use the area scale factor to find either the volume or length scale factor and this caused students the problem. Many did not make this connection and their solutions at this point were hindered. Those students that made this connection often went on to score full marks, but this was rare. Some students did score M1 here as they gave a correct area scale factor, but this meant that their progress with this question was limited. As the 5th M mark could be achieved using the base area of P and *EB*, occasionally this mark was awarded. The final M mark was dependent on the previous 5 M marks and so only the best students achieved this mark.

Question 27

This question was either answered well or not. Quite often this question was left blank. Those that attempted the question and realised that differentiation was required scored well, usually full marks, and those that did not often scored no marks. Many students differentiated correctly and set their linear expression = 6.5, scoring the first 2 M marks. The most common error seen was to set the differential = 0 and no credit was given for this. Once set = 6.5 most students were able to go on and find the correct x value and corresponding y value, so the next 2 marks were awarded. At this point the final M mark was often awarded as the x and y values were used correctly to find the length of *PQ*. The most common errors seen included numerical errors in their calculation of *PQ*.

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