Examiners' Report
Principal Examiner Feedback

Summer 2025

Pearson Edexcel International GCSE
In Mathematics B (4MB1) Paper 02

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

Summer 2025
Publications Code 4MB1_02_2506_ER

Introduction

In general, this paper was well answered by the majority of students. Some parts of the paper proved to be quite challenging to some students, such as the minimum surface area on question 8, Pythagoras' and trigonometry in 3D on question 9, and the more challenging parts of questions 7, 11 and 12.

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

- Showing clear working, particularly when it is requested in the question eg question 8, question 9, and question 21
- Make sure they have appropriate equipment for a Mathematics examination eg for question 1 and question 2
- Focus their students' attention on the following topics
    - Maxima and minima problems
    - Pythagoras' theorem and trigonometry in 3D
    - Solving algebraic problems set within function questions

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.

Question 1

This proved to be a nice easy start to the paper. Many students were able to measure the required angle and then go on and correctly calculate how many students that sector represented. Occasionally students measured the required angle inaccurately (outside the tolerance allowed by the mark scheme) and so lost the B mark. Students should be encouraged to show their working as an incorrect answer with no working would score no marks.

Question 2

Students were able to gain some marks in this question with many scoring full marks. Many students were able to draw an arc centred on P with a radius of 3 cm, but occasionally the arc dawn fell outside the tolerance allowed. Many were able to draw a line parallel to QR that was 6 cm from QR, but occasionally the line drawn fell outside the tolerance allowed. The angle bisector caused students more of a problem. Too many students produced a bisector that fell outside the allowed tolerance or produced a bisector without any evidence of arcs. Students should be encouraged to show the required region by shading. This mark was not awarded if the area indicated was ambiguous.

Question 3

Students were able to score well in this question. Parts (a) and (b) were answered well with many students scoring both marks as they could write a number in standard form and write an ordinary number when given a number in standard form. In part (c), (ii) caused students more issues than (i) In (i) the common error seen was write 10.8×10^{241} as final answer. Obviously failing to realise that for a number to be written in standard form it must be in the form $k\times10^{n}$ where $1\leqslant k<10$. In (ii) a common error was to combine the 5.4 with 2 to give an answer that started with 7.4. It was not uncommon to see an incorrect answer of 7.4×10^{241}

Question 4

In part (a) many students were able to correctly calculate the area of the sector and so scored full marks. Common errors include using 2.5 rather than 5 as the radius of the sector, calculating the arc length rather than the area of the sector or calculating the area of the triangle using $0.5ab\sin C$. Part (b) caused students slightly more issues than part (a). Those that worked out the area of the triangle usually went on to show a correct method to find the weight of the grass seed. Many students scored the first M mark as they showed a correct method to find *BC* and/or *CD*. A common error for the next M mark was to assume that the triangle was isosceles and so this mark was withheld. Whilst the next M mark allowed for follow through it required the area of triangle *BCD* to be labelled or clear indication that the area of triangle *BCD* had been found. Unfortunately, this was not always the case and so no further marks were gained. The final A mark was sometimes withheld as the final answer was incorrect due to multiple rounding throughout the problem.

Question 5

Students were able to score well in this question. In part (a) many students scored full marks. Those that didn't often scored 1 mark as they showed a correct method to find the number of cushions or the number of towels rather than the number of blankets. In part (b) many students scored full marks. Common errors included either finding 16% and subtracting from £15.95 or working out a percentage decrease by multiplying by 0.84. Part (c) caused students more issues than any other part of this question. Those that understood how to find a percentage profit often scored 4 marks. Some students were able to score some marks as they realised to answer this part of the question, they needed to calculate the total cost and/or total income or total profit. A common error here was to use total income as the denominator in their calculation for percentage profit. Part (d) was answered well by the vast majority of students as they seemed well rehearsed in using exchange rates.

Question 6

Part (a) Many students were able to use the given information to set up and solve an equation in x. Those that didn't usually stemmed from a lack of understanding of the given Venn diagram. In part (b) and part (c) students fell into two camps, those that understood the required parts of the Venn diagram to be added together and those that did not. A variety of incorrect answers were seen in these 2 parts. In part (d) the notation $n(B \cup C')$ seemed to cause students more issues than parts (b) and (c) which were in words. Again, a variety of incorrect answers were seen. Part (e), possibly because it did not require an interpretation of the Venn diagram, was answered well by many students. Many students scored full marks albeit that they broke the question up into stages.

Question 7

Part (a) Many students were able to correctly complete the tree diagram from the given information. The most common error seen was students that completed the 2nd branches of the tree diagram without realising that the probabilities came from a situation where the first counters were not replaced. Part (b) Many students scored both marks and for those students that completed incorrect tree diagrams sometimes scored M1 as the mark scheme allowed for follow through the student's tree diagram. Part (c) proved to be difficult and only the best students were able to process the information given and score marks. It was rare for students to score full marks as the extra bag meant that students could not simply use the given information to write down a correct 3rd probability. A common error was to write down the P(all Red) as $\frac{10}{15} \times \frac{9}{14} \times \frac{4}{7}$. The fact that this was combined with a conditional probability meant that a fully correct solution was rarely seen.

Question 8

Part (a) It was pleasing to see that many students showed sufficient working in this part of the question and therefore scored full marks. Those students that did not score full marks were usually able to score some marks for either writing a correct expression for the volume of the cuboid or for writing a correct expression for the surface area of the cuboid. Occasionally students arrived at the given answer without showing sufficient working and as such the final A mark was withheld. Part (b) was more problematic for students. Many students were able to score 2 marks as they realised that they needed to differentiate and set equal to 0. However, as they needed to differentiate $\frac{3a}{x}$ some students failed to differentiate accurately. The next part of the solution was where issues arose. Those that solved simultaneously to arrive at $12x^3 = 400x$ were usually successful in scoring full marks. Those that rearranged to make *a* subject of the formula and substitute into an equation for *x* quite often made errors in their algebraic manipulation and so lost marks. A common error was to set $\frac{dS}{dx} = 400$ and this limited students to only 1 mark. Occasionally the final mark was withheld as students gave answers that did not match the accuracy required in the mark scheme.

Question 9

Students found this question difficult and only the better students scored full marks. Part (a) was answered better than part (b).

Part (a) All 3 approaches shown in the mark scheme were seen. The most common approach was to split the hexagon into 6 equilateral triangles and many students that took this approach scored full marks. Occasionally the final mark was withheld as students gave answers that did not match the accuracy required in the mark scheme. In part (b) some students left this part blank, and it was clear that they didn't know how to approach problems that involved 3D Pythagoras' and trigonometry. Those students that made some progress in the question often scored the first 2 marks as they realised that they needed to find *XA*/*XD* and *XM*/*MD*. These were occasionally seen in the diagram and for some students they were unable to make any further progress. The next step was key to answering this question. Without finding the length of *AM* students would not be able to find the required angle. So, for those students that did not do this, no further marks were available. Many students that were successful in finding *AM* usually did this in stages, i.e by finding angle *AXD* or angle *ADX* and then substitution into the cosine rule to find the length of *AM*. The next 2 marks required use of the cosine rule or the sine rule to calculate the required angle. When either the cosine rule or the sine rule can be used to find an angle students should be encouraged to use the cosine rule as the sine rule can lead to an incorrect answer.

Question 10

Part (a) Many students were able to use the factor theorem to show that $(x - 2)$ was a factor of f(x). A few students substituted –2 rather than 2 into f(x) and the mark scheme allowed students to score M1. A few students used long division, and this was not given any credit as the question specifically asked for the factor theorem to be used. Part (b) Students were able to gain some marks with many scoring full marks. Common errors involved algebraic errors when trying to factorise the given cubic. Common incorrect quadratics seen include $x^2 - 2x + 1$ and $x^2 - 2x - 1$. Some students went on to spoil a perfectly good answer by solving the cubic. Part (c) was answered well as students could find the required values to complete the table, and often full marks were awarded. Occasionally an error occurred when finding the y value for $x = 1.5$ and so only 1 mark was awarded. Part (d) allowed students to gain some marks. Many plotted accurate points but some decided to join the points with line segments rather than a smooth curve and this cost students a mark. Part (e) was the part of the question that caused students the most problem. Only the better students were able to identify and draw the required line. Those that did often gave an acceptable answer and scored full marks. A few, however, gave the corresponding y value or gave a range of answers and so the final mark was withheld.

Question 11

Part (a) Many students scored some marks in this part of the question. Students that decided to factorise and then write an expression with a common denominator often scored full marks. Whilst students could write the expression with a common denominator first, often algebraic errors occurred, and marks were lost. A few students lost the final mark as they got to an answer of $\frac{2x^2 + 4}{(x + 4)(x + 2)}$ and missed that the answer needed to be given in its simplest form. Part (b) Many students scored full marks, and it appears that students are well rehearsed in substituting numbers into a composite function. Part (c) It was pleasing to see that many students were able to find an inverse function. A few lost marks due to algebraic errors. Occasionally students lost the final mark as they left their final answer in terms of y rather than x. Part (d) caused students to have more issues than the other parts of this question. Very few students recognised that the question could be answered using $\mathrm{h}(x)=\mathrm{h}(x)^{-1}$ and the alternative given in the mark scheme was the most common approach. The first mark was often awarded for a correct expression for $\mathrm{hh}(x)=\dfrac{\dfrac{x+5}{2x+3}+5}{2\left(\dfrac{x+5}{2x+3}\right)+3}$. This method was far more complex and often led to algebraic errors. Better students were able to get to a correct 3 term quadratic or a correct cubic. However, some students who had found a correct cubic could not solve this. The final mark was often withheld as the other root/roots were not rejected and this was required as the question specified that $x > 0$.

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom