Examiners' Report
Principal Examiner Feedback

January 2018

Pearson Edexcel International GCSE
In Mathematics B (4MB0) Paper 01

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Principal examiners report on 4MB0 paper 1

Paper 1
Introduction

Although this was a calculator paper it was good to see that students had remembered to show their working so that, even if their final answer was incorrect, they could gain marks for their method. Most candidates had also rounded their answers to the accuracy asked for but for some premature rounding cost them marks.

Overall a lot of blank responses were seen.

We saw a lot of unclear and rather rushed looking writing and found that x's and y's sometimes looked like 4's. Sometimes numbers were unclear and in particular the difference between 9's and 4's was difficult to decipher on some scripts. There was also a problem in Q10 where it was difficult , in some cases, to see if what was written were equals signs or inequality signs.

Report on Individual Questions

Question 1

This question was answered very well with the majority gaining full marks. The most common mistake was to get mixed up with percentages or to show working that suggested there are 100° around a point.

Question 2

A good number of students gained full marks for this question.

Those who did not were often able to benefit from a method mark for writing 84 or 40 as a product of primes or writing at least five multiples of each number.

As is always the case with this type of question, some students inevitably get mixed up with Lowest Common Multiple (LCM) and Highest Common Factor (HCF).

Question 3

As this was a 'show that' question it was essential that, if full marks were to be gained, a student showed us all the stages of their working; those that did not do this failed to achieve full marks.

The students who expect us to jump from $\frac{25}{6}-\frac{9}{4}$ to $\frac{23}{12}$ clearly would not gain 2 marks,

However, it was pleasing the number of students who did do well in this question with some explaining even more than we would have expected.

Question 4

Many students gained full marks on this question, but a substantial number who showed that *n* would need to be 31.5 failed to tell us that this meant **NO** 117 was not a term of the sequence, this meant they were limited to 1 mark out of 2. A significant minority of students substituted 117 for *n* in $4n - 9$
A few candidates found $n = 31.5$ and then incorrectly went on to say **YES**, failing to interpret the non-integer value of n.

Question 5

This question was done quite well. Mistakes were made where students found the area of the sector rather than the arc length and some used pi × radius rather than 2 × pi × radius or pi × diameter in the formula.
A small number of candidates were convinced they needed to use trigonometry here.

Question 6

While several students were able to correctly give 24 as the number of sides of a polygon with exterior angle of 165°, it was disappointing that others gave answers such as 178 or 2.18 sides, usually from wrongly remembered formulae. Formulae such as
Exterior angle = $\frac{(2n-4)\times 90}{n}$ or $\frac{(n-2)\times 180}{n}$ were used well in many cases, but some students substituted the exterior angle into the formula for *n* or failed to divide by the *n* of the denominator.
Students using methods based on the external angle generally produced better responses than those struggling with the internal angle formulae.

Question 7

We saw a fair number of correct answers but it was disappointing that many students who were able to give a completely correct inequality for values of *x*, failed to 'Find the integer values such that...' Students must read the question carefully so they give the answer in the form required in order to gain full marks. Of students who struggled with solving the inequality, 'losing' the negative sign from the left-hand side was common. Some students who gave a list of numbers didn't realise the need to include 0 as an integer value, giving −1, 1, 2 rather than −1, 0, 1, 2.
A small number of candidates attempted to reduce the expression to a single inequality.

Question 8

(a) We saw a good number of correct answers for this question, those that were incorrect showed methods indicating they were using both conversions in the table and rather than just multiplying by 136, multiplied or divided by 1.18 as well.

(b)This question was quite well answered. Mistakes involved multiplying 45600 by 136 and by 1.18 rather than dividing by 136 or just dividing 45600 by 136 and not continuing the exchange of pounds into euros. The decimal point got ‘lost’ by some and others did the calculation in two stages and prematurely rounded after the first stage consequently gaining an answer out of tolerance and so failing to gain the accuracy mark.

Question 9

For those students who realised this question was to do with powers or 2 or in fewer cases, powers of 4, this question was straightforward and they generally gained the correct answer. Several showed they thought that 4^{x+4} could be treated in just the same way as $4(\underline{x} + 4)$ and solved the equation $32 = 4(\underline{x} + 4)$.
A small number of students successfully using a logs to find a solution, whilst not on the specification this was a perfectly acceptable method.

Question 10

While the shaded areas were bounded by solid lines and the symbols should have include ‘equal to’ we condoned ‘greater than’ or ‘less than’.
The majority of students were able to correctly get at least two of the inequalities correct with many gaining full marks. It was surprising how many rearranged the equations to give a great variety of equivalent inequalities such as where we expected $y \le x - 2$, we also saw inequalities such as $x - y \ge 2$, $y - \mathrm{x} \le -2$, $x - 2 \ge y$. Some students repeated the equations without inequality signs and some gave signs that were very indistinguishable as the ‘greater than or equal to’ sign was made in one sweep of the pen. We would recommend writing symbols very clearly so that there is no question as to the meaning of the symbol.

Question 11

(a) This question on finding the mode from a list was very well answered with just a few finding the median or the mean.

(b) The majority of students scored full marks for this question requiring them to find the mean from a list of numbers. A few were confused with statistical concepts and found the median or the range. Some students showed 5.8 and rounded this to 6 but we awarded full marks; students should give the mean as the decimal or fraction it comes to and not feel it should be a value in the list of numbers and do any rounding, unless required to do so in the question.

Question 12

(a) This question which involved division of two given numbers and rounding the number to 1 decimal place was well answered. A small number of students truncated instead of rounding and gave 209.1 rather than 209.2. We also saw answers of 2.091 or 2.1 where incorrect values were put into calculators or students had an incorrect understanding of rounding.

(b) This question gained a mixed response. It seemed straightforward enough to ask students to multiply two numbers and give their answer in standard form to 3 significant figures. However, for both of the elements to be correct it appeared quite challenging. There were no marks for presenting the answer given by a calculator, but if this was rounded to 3 significant figures or written in standard form or 2.59×10^n then M1 was awarded. All elements had to be correct for the accuracy mark. Common mistakes were to round 25866437.77 to 259 with no regard for the zeros and also to truncate rather than rounding the number.

Question 13

(a) We had a lot of correct responses but some students overcomplicated this question and started to add or multiply products of probabilities where all they needed to do was find the number blue or green and put this over the total. Cancelling was not required, although many students showed $\frac{3}{4}$ as their final answer.

(b) A rather mixed response for this part of the question where the sum of 3 probability products were required with a non-replacement calculation. With only 2 marks available, a full method was needed for M1 and this escaped several. Some used a replacement method and could gain M1 only for this. Some students got mixed up with replacement and non-replacement and gave probabilities such as $\frac{8}{20} \times \frac{7}{20}$ or $\frac{8}{20} \times \frac{8}{19}$ and gained no marks.

Question 14

We saw several correct answers for this question about similar areas.
Some students did not understand they needed to square the linear ratio of the sides to find the ratio of the areas but often picked up M1 for writing the ratio of sides in some way. Some students did not seem to understand how the trapeziums being similar was significant and tried to find the area of trapezium *WWXYZ* by multiplying figures. Students must learn the significance of shapes being mathematically similar in order to do well on questions such as this.

Question 15

This question is similar to others from 4MB0 papers over the years and students have generally got the message that ‘show clear algebraic’ working means they will not get marks if they don’t adhere to this instruction. By showing working, students making just one slip could gain 2 of the 3 marks available. We saw many correct responses gained in a variety of ways including substitution that was not always easy to deal with.
It was pleasing that most candidates managed to ‘balance’ the x or y term, with only a few candidates incorrectly attempting to add or subtract the original equations. Generally more errors were made by candidates attempting substitution compared to elimination methods. Overall, we were very pleased with the clear presentation of student’s work.

Question 16

Most students were able to demonstrate they knew how to differentiate by getting $8x^3$ for the differential of $2x^4$. The problem that many students had, which restricted them to 1 mark only for the question was dealing with the quotient $\frac{6-5x}{x}$ correctly. Many mistakes were made and some even differentiated the numerator and gave this and $8x^3$ all over x. We condone this for one mark for $8x^3$ as long as it had been seen separately previously.
Candidates trying more advanced techniques such as quotient rule or product rule often made mistakes in their method limiting the marks they could gain from this.

Question 17

This question was done very well by most students. If not fully correct students often picked up at least a method mark for multiplying by the denominator and expanding correctly.
Poor numeral formation often caused confusion over 4 and u in the candidates working.

Question 18

While there were a good number of correct responses for this question about the determinant, the negative signs caused many students problems. Many candidate had a “correct” formula but without appropriate brackets. This often led to no marks as they expanded incorrectly and so at no stage had a correct expression written down.
Some students had forgotten the formula for the determinant and some wanted to use the inverse of a matrix.

Question 19

Several students were able to find the correct value for angle *x* with working that showed their method clearly. A surprising number of candidates equated the wrong pair of angles in the isosceles triangle.
Giving reasons is challenging for many and this was often the case here, although it was pleasing to see some very well set out responses with reasons for every step in their calculations. Some students ignored completely the part of the question that said 'give reasons for each stage of your working'.

Question 20

(a) The correct answer was often seen here but a disappointing number truncated their answer to gain 6.02 rather than the required rounded answer of 6.03

(b) Again, this question was well answered with many students gaining the correct answer but a number failed to divide by 2 or used the formula for the volume of a pyramid rather than a triangular prism. Truncating answers when longer methods were used, e.g. using the Sine rule first and finding side BC in triangle ABC, did not always arrive at the answer of 289 when rounded to 3sf.

Question 21

(a) There was a good number of correct answers for this vector question but also a good number getting their signs mixed up with a variety of ±4 and ±2 in their vector where they did not know they needed to subtract vector $\overrightarrow{OX}$ from $\overrightarrow{OY}$. A common response was to add the given vectors together.

(b) Most students realised they needed to do a Pythagoras' method to find the modulus of a vector and gained good results. We allowed follow through from an incorrect (a) as long as the values of ±4 and ±2 were used. M1 only was allowed for $\begin{pmatrix} 0 \\ 12 \end{pmatrix}$, the result of adding the vectors in (a) as this simplified the use of Pythagoras significantly.
A number of candidates lost final A mark by giving their answer as a decimal, rather than the requested surd.

(c) this was rarely correct but it was pleasant to occasionally come across a response worthy of the mark. Some students used ***i*** and ***j*** notation for this which was allowed, although not a requirement.

Question 22

(a) Students generally made a good start to this question but did not always gain full marks because they stopped once they had found their constant term. The question clearly asked for a formula for *y* in terms of *x* but it was surprising how frequently this was omitted.
A less common error was to not read the words 'inversely proportional', and students tried to find an equation relating *y* to x^3

(b) If the correct constant term was found in (a) students invariably gave a correct answer to this part.

(c) This part was slightly more challenging than the other parts, but students often gained full marks.

Question 23

(a) Several students made convincing progress with this ‘show that’ question and gained full marks. We awarded B1 for one of the missing sides of 5 or 7 stated or used but if students got as far as finding this they generally went on to do the full proof. Some students did the calculation as an ‘all in one’ sum while others split the shape into two parts – both were equally successful. There were plenty of unsuccessful students, some of whom worked with perimeter rather than area and some missed the point completely by solving the quadratic equation rather than showing the area of the shape could be given in that form.
Some of the weakest attempts were candidates attempting to multiply all the algebraic terms seen in the question.

(b) A lot of students were able to solve the quadratic equation and correctly reject −12 and use $x = 8$ for their perimeter. A number of students did not see the significance between this part and the previous one and so struggled with the perimeter in terms of x and sometimes ‘solved’ it to find a value. Some students who worked correctly to find x, failed to include the two missing sides of 5 and 7 when calculating their ‘perimeter’, giving a popular answer of 42 rather than 54.

Question 24

Many students found this question quite challenging, but it was surprising how few were seen to write out the members of the different sets before completing their Venn diagram.

(a) Many Venn diagrams were not correctly completed, a common error was the addition of 15 even though the universal set was said to contain positive integers less than 15. Sometimes numbers appeared in more than one region of the Venn diagram and some students forgot the area outside the circles completely.

(b,c,d) We had a mixed response from the questions involving set notation with the usual mix-up with the ‘union’ and ‘intersection’ signs. Some students also got mixed up with the terminology for ‘number of items in a set’ and gave us the items in the set rather than the number of items in the set.

Question 25

(a) It was disappointing how few students knew that the angle between a tangent and a radius is 90°. We allowed the mark for any mention of tangent and radius, unless it was clearly incorrect but few gained the mark.

(b) For those who knew the alternate segment theorem, this was an easy 2 marks, but few did and those who did, were unable to give the name of the theorem. If alternate segment theorem was not given as the reason, a student needed to give a longer explanation which was successful for some, but very few. Some working we saw suggested students were not familiar with the 3 letter notation for angles and in fact were trying to find the incorrect angle.

(c) Again, we saw some excellent attempts but many who showed little knowledge of circle theorems and among those that were able to find the angle correctly, few giving sufficient reasons for the size of the angle required.

Question 26

This question involving a speed-time graph and calculating acceleration, distance travelled and average speed was well done by a good number of students. However there were many who struggled with finding the distance travelled because they could not find the area of a trapezium. Those that split the shape into a rectangle and 2 triangles were often successful, but some got confused with their measurements.

We allowed a follow through mark for use of an incorrect total distance found in (b) but divide by 45 which benefitted many students. When answers come to a value such as for this question $\frac{50}{3}$ or $16\frac{2}{3}$ it would be advisable to leave it in fraction form to be sure of full marks. Candidates who put the answer as 16.6 lost the accuracy mark as we accepted 16.7 or better.

Question 27

(a) Some students showed an indication that they knew the range of g(x) but were unable to put this in correct notation and so the mark was withheld. We were happy with $\{y : y \geq 4\}$, $y \geq 4$ or $g(x) \geq 4$ but many do not appear to understand the significance of the notation.

(b) Many correct answers for the value that must be excluded from the domain were given.

(c) Many correct answers for this part were seen, generally by finding the inverse function of h. Some students started on a route to find the inverse, but had forgotten the complete process. It seemed easier to set the function h equal to 5 and find the value this way, but few students attempted the question like this.

(d) It was pleasing to see a good number of students getting this part correct, even some who failed to gain many or any previous marks for the question.
It was concerning to see some candidates give a correct answer of $(2 + (2 + x))$ but then lose the mark by ‘simplifying’ to $4 + 2x$.