Examiners' Report
Principal Examiner Feedback

January 2017

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

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General Points

Whilst this paper was no more difficult than those set in previous years, the vast majority of candidates found it very challenging with many responses (or lack of responses) showing a distinct lack of preparation for this paper. Indeed, centres should address all the issues contained below and, if necessary, contact the board to seek advice on how they may improve their candidates' performances in future examinations.

It was significant that on many papers more than half of the questions were not attempted at all and there was evidence, on the latter questions, that candidates ran out of time.

In particular, the following topics proved to be the most challenging and candidates should not only prepare themselves for these topics but also ensure that they read examination questions VERY carefully.

- Differentiation
- The concept of a light year
- Ratios
- Reverse percentages
- Correctly using volume formulae of standard three dimensional shapes
- Column vectors
- Gradient of a straight line and distance between two points
- Evaluation of angles (with reasons) of angles in a cyclic quadrilateral
- Histograms
- Indices
- Determinant of a matrix
- Geometric constructions
- Mean, median and mode
- Factor theorem
- Functional representation

In general, candidates 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.

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 candidates use methods which are beyond the scope of the syllabus and, where used correctly, the corresponding marks are given.

Details of Marking Scheme and Examples of, and Report on, Candidates' Responses

Question 1

A great number of candidates either did not tackle this question or did not understand that the number of articles sold, on average per day, was determined by the calculation 24 (hours) $\times 6$ (number of articles sold per hour) $\times$ 366 (number of days). The majority of candidates were able to carry out the arithmetical calculation correctly.

Question 2

Factorising the difference of two squares has proved to be quite a common question on these papers and it was disappointing to see that just under half the candidates were able to successfully factorise this expression.

Question 3

The majority of candidates showed that they were well drilled in the process of finding the Highest Common Factor (HCF) and, as a consequence, two thirds of candidates scored at least one mark on this question. The most common error was in finding the Lowest Common Multiple (LCM) instead.

Question 4

The majority of candidates were able to differentiate x^2 correctly and about half the candidates were able to give the completely correct solution. Of the remainder, many left the question unanswered.

Question 5

The vast majority of candidates either did not know where to start with this question, wrote the division the wrong way round or simply subtracted the smaller value from the larger value. The concept of a light year as a distance proved to be beyond many. As a consequence, no more than 15% of candidates were successful with this question.

Question 6

This question was perhaps the most challenging to candidates as 95% failed to score any marks at all here. Ratio questions of this type are commonly tested and centres should focus attention on correct techniques of elimination. Many scripts were either blank or a common incorrect answer of 5 : 3 was seen.

Question 7

Not knowing the correct formula for the volume of a cylinder proved to be the downfall for many candidates. Indeed, often surface areas were quoted leaving a large number of candidates scoring no marks at all.

Question 8

Whilst this was generally attempted, many candidates did not know how to handle a reverse percentage. Instead of seeing $76 \times \frac{100}{160}$, the majority of candidates simply found 60% of 76 and subtracted this value from 76 giving 30.4 (mm) as a popular, but erroneous answer.

Question 9

Much good work was seen by candidates in this question with the majority either using the correct formula $162n = (2n - 4) \times 90$ or correctly evaluating the size of an exterior angle of the polygon.

Question 10

The concept of column vectors was poorly understood and the vast majority of candidates scored no marks at all on this question. Many simply wrote down $\overrightarrow{BC} = \begin{pmatrix} 2 \\ 4 \end{pmatrix}$ rather than attempting to find $\left(\overrightarrow{BA} + \overrightarrow{AO} + \overrightarrow{OC}\right)$. A diagram, drawn by the candidate, would have proved to be very useful here. Over 90% of candidates scored no marks on this question.

Question 11

Exchange rate questions are a common feature of this paper but the majority of candidates did not seem to appreciate the data given in the stem of the question. Indeed, a common but erroneous answer of $\frac{53 + 490}{11.85} = 45.82$ was seen. A careful read of the question should have enabled candidates to calculate 3×490 (three watches). The concept of exchange was understood – the application of the concept proved wanting.

Question 12

This question on surds was reasonably well answered with over half the candidates scoring full marks. Of those that scored nothing, the vast majority gave the decimal equivalents of the 3 numerical terms given (showing the use of a calculator) or simply went straight to the answer (showing no working).

Question 13

Traditionally, candidates who take this paper are usually well-drilled in algebraic techniques and the vast majority of candidates scored some marks on this question as they were able to correctly cancel the numerical values or deal correctly with at least one of the index powers. Over 40% of candidates scored full marks here.

Question 14

A significantly large number of candidates scored no marks here as many seemed unable to interpret the data given in the question. Many diagrams seen were drawn incorrectly and the concept of an angle of elevation was beyond many. As a consequence, many simply calculated $15 \times \tan(20+35)$ giving a popular, but erroneous answer of 21.4 (m).

Question 15

The words *inversely proportional* seemed to prove most challenging to about half the candidates with these candidates either making no attempt or simply starting with $y = kx^2$. Of the remaining candidates, the vast majority were able to determine the correct value of k. However, finding r from a given value of F proved to be elusive to a significant number of candidates. Consequently, only about a quarter of candidates arrived at the required answer of $r = 35$.

Question 16

The performance by candidates on this question was quite worrying. Given two pairs of coordinates and asked to find (a) the gradient of the line joining these two coordinates and (b) the length of the line segment joining these two coordinates should have enabled the vast majority of candidates to score something on this question. Unfortunately this certainly was not the case with the vast majority of candidates leaving the question blank or either misquoting the standard gradient formula or the formula (Pythagoras) for the distance between two points. For this paper, these two processes should be well understood by candidates and the techniques need to be reinforced by centres.

Question 17

Whilst a small number of candidates got this question completely correct, over half the candidates either left the question blank or did not know where to start (by removing denominators). Of those that did progress, a significant number faltered at the statement $-2x > -16$. This, in itself, earned two marks but then writing down $x > 8$ lost the final A mark. Fortunately for these candidates, the mark for part (b) was a follow through mark from their incorrect inequality and a significant number of candidates were able to score this mark.

Question 18

The unusual layout of the diagram did not seem to put candidates off this question and parts (a), (b) and (c) were done particularly well with about three quarters of candidates scoring full marks. Part (d) proved a little more challenging as many candidates seemed to think that the answer required must contain at least one element. About 60% of candidates however arrived at the required answer of $\emptyset$.

Question 19

The vast majority of candidates got no further than identifying $\angle ABD = 70^o$ or $\angle ACB = 50^\circ$. This, in itself, earned one mark but then incorrect geometric assumptions were made which led many candidates to achieve no further marks. The primary (incorrect) assumptions made were either $\angle EOD = 50^\circ$ or 20°. These incorrect values seemed to be justified by either *alternate angles* or *angles on the same chord*.

Question 20

This question was quite a challenge. However it was pleasing to see that three quarters of candidates scored at least the first two marks and a quarter of candidates went on to score full marks. Whilst candidates were found wanting on many techniques on this paper, algebraic manipulation was not one of these techniques.

Question 21

Despite the fact that the first mark for the first table entry could have been determined from the two bars given on the histogram, over half the candidates scored no marks at all on this question. Indeed, both marks for the table were accessible without the knowledge of histograms by simply comparing heights of the two given bars and completing the table from the data given in the first statement: *320 students sat a test*. About one-fifth of candidates scored at least 4 out of the five available marks on this question.

Question 22

This question on powers of 2 and powers of 4 was perhaps the most challenging on the paper with about 90% of candidates either leaving the question blank or making very poor attempts at the solution. In part (a), the vast majority missed the fact that $2^{101} + 2^{103}$ could be written as $2 \times 2^{100} + 2^3 \times 2^{100}$ and in part (b), 2^{100} could be written as $2^{50} \times 2^{50} = (2 \times 2)^{50} = 4^{50}$. This, in turn, could be written in the form $4^2 \times 4^{48}$. About 5% of candidates correctly manipulated their powers of 2 and 4 and arrived at the required answer.

Question 23

More than half the candidates did not seem to understand what was meant by the determinant of a matrix and, as a consequence, scored no marks on this question. Of those who did know what to do, the vast majority showed excellent algebraic technique to arrive at the required answers for the resultant quadratic equation.

Question 24

The construction of the bisector of an angle and the construction of the perpendicular bisector of a line are the two standard constructions that should be well drilled into candidates. Unfortunately, this did not seem to be the case with over 75% of candidates who scored no marks on this question. With a significantly high number of scripts showing a blank response this suggests that the topic has not been taught or the candidates did not have the right equipment to complete the task.

Question 25

Whilst this was a straightforward question set on the mode, median and mean of a tabled distribution, the candidates' responses were extremely disappointing. Less than half the candidates wrote down the mode correctly and over 80% of candidates either didn't write down the median age or gave the incorrect answer of $\frac{11+12}{2}=11.5$.
Candidates fared no better with part (c) with a large majority scoring no marks at all on this part of the question. A common error was seeing $\frac{(8+9+10+11+12+13+14+15)}{8}$ rather than an attempt to use the frequencies given.

Question 26

There were many blank spaces here indicating that candidates did not know what to do or were running out of time. A correct trigonometrical equation enabled about a third of candidates to arrive at the required answer for *BD*. There were a number of different ways that candidates could progress to find the area of triangle *ABC* but only about 12% of candidates were able to obtain full marks here. A small, but significant, minority failed to round both their answers to the required degree of accuracy.

Question 27

Using the factor theorem to show a linear expression in x is a factor of $f(x)$ is tested frequently on this syllabus and it was both surprising and unsettling that over 60% of candidates either left the question blank or struggled to answer. Indeed, 20% who correctly substituted -2 into the cubic, failed to evaluate correctly or draw the conclusion that the substituted expression was equal to zero. Part (b) required either equating corresponding terms of the expansion of $(x+2)(ax^2+bx+c)$ to the original cubic or carrying out the division of the original cubic by $(x+2)$. Neither method proved to be evident and less than 10% of candidates scored any marks in this part of the question.

Question 28

Again there were many blank responses to this question. In total over 8% of candidates scored no marks at all on this question. Of those that did, many did not get past part (a), with only a handful of candidates achieving full marks here. With the distinct lack of responses to this question, it is difficult to give any assessment of where candidates were going wrong.

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