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Examiners' Report
Principal Examiner Feedback

January 2018

Pearson Edexcel International GCSE

In Mathematics B (4MB0) Paper 02

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Paper 02

Introduction to Paper 02

It was pleasing to observe that, overall, the clarity of work was high. However, there were some students whose work was poorly presented and was thus difficult to follow and, in a few cases, was illegible. It would be prudent if Centres emphasised the importance of clarity in the students' examination responses.

The question paper did highlight the following problem areas, followed by their corresponding question numbers, which should receive special attention by Centres:

- Bearings and constructions ((1))
- Algebraic manipulation of signs ((2(a)))
- Problems involving the reverse calculation of compound interest ((4(c)))
- Estimate of a mean ((6(b)))
- Conditional probability (7(a))
- Descriptions of transformations, drawing enlargements, matrix solutions of simultaneous equations((8))
- Line ratios and their use in finding areas of triangles (10)
- Mensuration of cuboids, inequalities (11)

Report on individual questions

Question 1

Many students were able to measure accurately enough to gain a correct answer to a(i) and a number of these were also able to obtain an acceptable bearing in a(ii). However constructing a perpendicular bisector was beyond many students which resulted in some very poor responses to (b). Overall, bearings still appear to be poorly understood by many students.

Question 2

In part (a), most students were able to substitute -1 for x in the formula, but a few then became confused with negative signs and so did not find the correct value of k, for example, 24, instead of -26. In (b), some of those who had found k correctly were able to divide the cubic by $x + 1$ and continue on to factorise the expression. A small number created extra work for themselves by not realising that they had been given one of the factors, ie $x + 1$,of the cubic in (a).

Question 3

In part (a), most of the students were successful in completing this proof. However there were a number who failed to include both ends in their surface area calculation, often including neither on many occasions.

A majority of students completed part (b) successfully by using a correct volume of 540π. However, a sizeable minority treated the given surface area of 252π as the *volume* with the subsequent loss of all the marks for this part of the question.

Overall, this question was well answered.

Question 4

The majority of students answered part (a) correctly. In part (b), most students successfully found that Sannia received \$119.20 from the items she sold but then failed to find the actual value of the items as required by the question (M0 A0). In part (c), one of the discriminators of the paper, only the best students were able to find the correct approach to this reverse compound interest problem. The difficulties for the others were created by having to use a reverse procedure with a small, but significant, number of students just adding the percentages together and then trying to work with 14.1% showing a lack of understanding of percentages.

Question 5

In part (a), nearly all were able to substitute $t = 3$ into the formula for S, however, some then made mistakes in combining the terms whilst others did not understand that the *displacement* was required and gave their answer incorrectly as 3.

In part (b)(i), all but the weakest students knew that they should differentiate the given displacement and most were successful in doing so. Also, in part (b)(ii), a large majority were able to correctly equate their velocity to zero and to solve the resultant quadratic equation to obtain the required values of t.

In part (c), the majority differentiated correctly, substituted $t = 4$ and obtained the correct acceleration. A minority, though, substituted $t = 4$ into either the given expression for s or their expression for v, scoring nothing.

Question 6

A majority of students completed the table correctly with an answer of 10 but there were a few who gave 2.5. Most students drew the middle bar correctly but a number had problems with the heights of the other two bars. Thus the popular marks for (a) were 2 or 4. In part (b), many students had the correct approach and, aside from careless errors, were able to obtain the correct mean. However, the answers of a minority indicated the need for more practice in order to fully understand what a mid-interval value is and how to use it.

Question 7

Part (a) was another discriminator and was very disappointingly answered with only the best students showing the ability to cope with the concept of a conditional probability. The majority of students obtained 0.04 rather than 0.25,that is, multiplying rather than dividing the two given probabilities.

In part (b), those having gone wrong in (a) did not put their answer to (a) on the appropriate branch of the tree diagram. They chose 0.1 rather than choosing their incorrect answer to part (a). However, many did understand enough about probability trees to place 0.6, 0.05 and 0.95 on the correct branches. A very small minority had no real idea what to do and came up with rather unexpected values.

It was pleasing to observe that a majority pf students were able to recover here and combine the probabilities on their tree in the correct fashion in order to obtain a successful follow through answer to part (c) (M1 A1).

Question 8

Part (a) was a discriminator, with "rotation" (B1) being often stated but then usually followed by 90^o *anti*clockwise (B0) when it should have been clockwise. Very few gave the correct centre. Many students were able in part (b) to enlarge the figure correctly but only a few were able to locate the centre of enlargement correctly. Some incorrectly used matrix methods assuming the centre to be the origin. In part (c), a reasonable number were able to complete this part by using the inverse matrix (although a sizeable number failed to correctly find the inverse matrix) or by a simultaneous equation method. Unfortunately, a number erroneously decided to transform *A* using the matrix *T*. Part (c) was another of the discriminators of the paper.

Question 9

Fortunately, many students found this question more straightforward than previous trigonometry questions thus giving the less able an opportunity to gain some success, where students often they had seriously struggled.

Most in part (a) were able to approach this correctly. A few failed to work with surds and so were not able to reproduce the required given exact solution. In (b), many incorrectly assumed that *EM* = 15, gaining no marks. In addition, a number failed to take the simple approach of using the tangent ratio in triangle *EMO*.

Part (c) was well done by the majority of students. The use of the cosine rule in triangle *ABE* was easily the most common approach. The fact that this is an isosceles triangle did enable other successful approaches.

Overall, part (d) was well done by most. students

Question 10

Most students were successful in part (a)(i), however many of the weaker students were caught out by ratios, as in previous examinations, and used $\frac{2}{7}$ instead of $\frac{2}{5}$. A majority of i students n part (b) followed through correctly from their answers in (a) and many had complete success.

The majority of the students in part (c) fortunately knew how to equate components of **a** and of **b** in their versions of $\overrightarrow{AX}$ obtained in (b). Most errors seen where due to careless slips during their algebraic manipulations.

Part (d) was a discriminator. Only the very best students had any idea of a correct approach to the solution.

Question 11

As with previous examinations, the algebraic sections of this question (parts (a), (b), (c) and (d)) were only properly attempted by the more able students. Many of these were successful in part (a) but some of these were confused by the dimensions of the cuboid causing some incorrect working. The presence of the given expression for *S* allowed students to recover, resulting in many usually gaining 3 out of the 4 marks for (c) and if the correct value for *x* had been obtained (*x* = 2.08), the correct value for the minimum value for *S* (51.9) usually followed in (d).

Unfortunately, in part (e), a number of students gave 69.6 (B0) for the value of *S* at *x* = 3.5, despite being asked for a whole number answer. The graph in (f) was usually successfully completed with any errors being caused by carelessness. Part (g) proved problematic to most students who seem to be unfamiliar with the basics of inequalities.