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Examiners' Report/ Principal Examiner Feedback

Summer 2013

International GCSE Mathematics B (4MB0) Paper 02

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General comments

It was pleasing to observe a high standard of responses. The question paper did highlight that in general students found the following topics (followed by their corresponding question numbers) to be more challenging:

- Giving geometrical reasons (2a)
- Understanding and interpreting Venn diagrams (4a and c)
- Combining independent and mutually exclusive probabilities (7cii)
- Describing transformation in the plane (8d)
- Use of ratios with vectors, finding the ratio of sides and areas (9)
- Mensuration and associated algebra (10a & b). Inequalities applied to graphs (10)
- Breaking down 3D diagrams into their 2D components (11b and c)

Report on individual questions

Question 1

This was a standard question on the solution of simultaneous linear equations, and so it was pleasing to observe that many students scored full marks for this question. However, those who chose the substitution method usually made algebraic or arithmetic errors normally losing the 2 accuracy marks.

Question 2

Many students correctly found that $\angle CAD = 60^{o}$, however, as in the past with such questions, some had difficulty with or omitted to state the geometrical reasons they used to find the angle. Some students erroneously arrived at $\angle CAD = 50^{o}$ (by assuming that ΔCAD was an isosceles triangle) thus scoring 0 marks for (a) and 2 marks for part (b), provided that they used their $\angle CAD$ correctly in the sine rule.

Question 3

This question was generally quite well done, however, some students did not understand what was required and merely substituted $x = -\frac{1}{2}$ to obtain the *y* value. The majority differentiated correctly. A few students used the 'completing the square' method but failed to correctly conclude that $\left(-\frac{1}{2},\ 6\frac{1}{4}\right)$ was also a stationary point. There were many correct attempts at part (b) with many students realising in part (b)(ii) that since the second derivative was negative, the stationary point was a maximum.

Question 4

Most students scored marks for part (a), however, less able students had difficulties completing the Venn diagram in part (b), resulting in the loss of many subsequent marks. Many erroneously thought that $F \cap M \cup V'$ was the answer to part (c). Part (d) was well done by most, although some could not form the equation in spite of having completed the Venn diagram correctly, usually by forgetting to add the intersections ($x + x + x + 5$).

Question 5

Generally, this question was well done with many students being able to form the equation in part (a) and then cross multiply correctly. Most then went on to solve the quadratic equation in part (b) but many lost the final 2 marks because they did not substitute their x value to obtain the distance required.

Question 6

Most students scored the 2 marks for part (a) without difficulty. Part (b) was usually answered correctly showing that most students had a sound understanding of the manipulation of matrix elements. A number of students lost marks in part (b) for their evaluation of c, having usually calculated a, b and d correctly, but then losing 1 or 2 marks depending on whether they had found the correct equation for c.

Question 7

Most students scored full marks for parts (a), (b) and (c)(i). However, (c)(ii) presented difficulties for most as they were not able to break down the ways of finding a "Grand Total" of 9, usually resulting in the loss of all the available marks for this part.

Question 8

A significant number of students scored most of the marks for parts (a), (b) and (c), although some marks were lost due to incorrect labelling or matrix multiplication written in the wrong order (part (c)). It is important that students follow the labelling instructions given in the question. Part (d) proved to be a good discriminator with many of the students who did score marks here usually losing 1 mark for the enlargement scale factor.

Question 9

It was pleasing to see a reasonable number of fully correct answers to this vector question. However, it was clear that many students did not understand how to use the ratios given in the question and this was demonstrated in parts (a)(ii) and (b)(i) with the resulting loss of marks in the latter parts of the question.

A few students did not name the quadrilateral in (b)(ii) correctly even though they had successfully answered part (b)(i). Part (c) proved to be quite challenging to most. Able students realised that the importance of the similarity of the triangles meant that the ratio could be obtained from examining the areas of the triangles or directly from the ratios of the corresponding sides - which was hinted at by the ratio $OF : OC$ given in the question. Some, however, did not square their ratio for their final answer. Those who successfully answered part (c) usually went on to give a correct answer in part (d).

Question 10

Part (a) showed that there were a significant number of students who were not able to translate their verbal reasoning into algebra. Part (b) was well done by most students and having the answer given clearly helped them although the less able students had problems with their algebra and this prevented them from arriving at the correct conclusion from their working. Parts (c) and (d) were well attempted by nearly all students although some had difficulty with plotting the given final point at $x = 6.5$. Part (e) was usually correct. Part (f) demonstrated that there are still a significant number of students who find inequalities challenging and thus their application to graphs was a step too far for them.

Question 11

It was pleasing to note that a reasonable number of students scored most of the marks for this question and were not put off by the 3D nature of the trigonometry. Part (a) was nearly always correctly answered. Part (b), though, proved a problem for many who did not spot the construction line to form a right angled triangle. There were some students who correctly used the indirect approach of using the cosine rule on ΔEDC or ΔEDA. Most students found *DB* and applied the cosine rule correctly to find $\angle EBD$ in part (c). However, less able students had difficulties with interpreting the 3D diagram usually thinking that $\angle EDB = \angle EDC + \angle BDC$. In part (d) many students found the two areas (*BED* and *ACDE) correctly* but there were some who read "calculate the *total* surface area" and hence found the total surface area of the solid. Some did not correct the final answer as required.

Grade Boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link:
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