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Examiners' Report
Principal Examiner Feedback

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Pearson Edexcel International GCSE
Mathematics B (4MB0/02R) Paper 02R

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Introduction

It was pleasing to observe that, overall, the standard of presentation and clarity of work was high.

As in previous examinations, it would be prudent for Centres to encourage their candidates to answer the questions within the examination paper booklet and not, if at all possible, on any extra sheets of paper but if they are continuing a question on a page which does not relate to the question that they are answering, they must indicate that they *are* continuing the question on another page in the examination paper booklet or on a separate sheet of paper *and* indicate that page number and then clearly identify the question on that page.

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

- Matrix multiplication ((1))
- Volume of a pyramid ((2))
- Distance travelled by a particle (4(e))
- Conditional probability (5(d))
- Integer values relevant to inequalities ((6))
- Showing all relevant steps in a question (8(b))
- Parallel vectors (9(b)) and triangular areas (9(c))
- Angle of depression (10(f))

Report on individual questions

Question 1

This question was answered correctly by those candidates who were able to perform the matrix multiplication. The others tended to pick up at most 2 marks from obtaining the equation in x alone and then finding the correct value of x (M1 A1) – the second equation was invariably wrong.

Question 2

This question proved problematic to those students who did not realise that they had to use the given length of the diagonal ($400\sqrt{2}$ cm) to find the area or the side length of the square base of the pyramid, gaining no marks. Other candidates had problems with converting cm to m or cm^2 to m^2, losing at least one mark.

Question 3

This question was generally well attempted with some candidates losing the final accuracy mark for not simplifying their ratio correctly. A common error in (b) and (c) was to use 360 instead of the candidate's answer to (a) in their expressions for the number of female students and of the male students (M0 A0, M0 then M0 A0).

Question 4

Many candidates collected full marks for parts (a) to (d) but part (e) was a discriminator with fewer candidates collecting all 3 marks, although many gained the method mark for evaluating the distance at $t = 5$ seconds. This was usually followed with $s(0)$ □□$s(5)$ = 55 – 45 = 10m as an incorrect attempt at finding the distance travelled in $0 \le t \le 5$, scoring M0 A0.

Question 5

Many students collected most of the marks for parts (a) to (c) with the exception of (c)(i) for which the mark was invariably lost. A common error in (a) was to think that $\mathrm{n}\left(\left[C \cap P\right] \cap B'\right)$ = 7 (and not 2), $\mathrm{n}\left(\left[B \cap C\right] \cap P'\right)$ = 13 (and not 8) and $\mathrm{n}\left(\left[B \cap P\right] \cap C'\right)$ = 12 (and not 7) which was treated as a special case and which could have gained 3 marks for (a), 1 for (b), (c) and (d). Conditional probability appears to be an area of suggested future attention by Centres as many candidates were not sure of how to answer part (d). Of those that tried, many had a common incorrect answer of $\frac{6}{50}$ (thus thinking that all of the students studied Physics) which gained just one B mark (for the numerator).

Question 6

Many candidates made a reasonable attempt at this question although a number collected just the method marks because they failed to give the possible integer values of x as required, possibly because they had not read or understood the demand of the question. Others were let down by their poor algebra usually resulting in the loss of the 2nd method mark and the two accuracy marks.

Question 7

A significant number of candidates collected most of the marks here. A mark was often lost in part (c)(i) for giving one value of x $\left(\frac{5}{4}\right)$ and ignoring the second one $\left(-\frac{5}{4}\right)$. Candidates lost marks in (c)(ii) for careless algebra (particularly when expanding $2(3x$□$1)^2$) when trying to find $\mathrm{gf}(x) = x$ resulting in an incorrect quadratic which meant that they had only two of the 5 marks available to them.

Question 8

There were a number of candidates who were unfortunately defeated by the demands of this question and thus made little progress on its solution. Many candidates collected the mark for (a)(i) and most of these went on to correctly answer part (a)(ii). Numerous candidates correctly calculated $\frac{7}{18}$ for the probability in part (a)(iii) but a number then forgot to make a valid concluding statement thus losing the final A mark. Candidates who were successful in part (a)(iii) went on to answer part (b) correctly but it should be stressed to candidates that they must include all necessary steps in a “show that” if they are to gain the relevant mark(s) (the last A mark in (a)(iii) and (b)).

Question 9

Unfortunately, vector questions are not as well rehearsed as other questions with the result that a number of candidates scored poorly on this question. Part (a) was usually well answered but there a number of students who lost marks in part (iii) for finding $\overrightarrow{AM}$ and not $\overrightarrow{OM}$ as required. Correct solutions in (a) often led to a correct vector of 2.5**c** for $\overrightarrow{PM}$ in part (b). The conclusion, however, was muddled and often candidates discussed ratios rather than the directions of the two vectors (A0). Part (c) was a discriminator with many candidates thinking that triangles *APM* and *AOC* were similar, losing all three marks in part (c).

Question 10

It was pleasing to see few incorrectly corrected answers in this question. (a) was generally well done by many candidates correctly applying the given sine rule although some were let down by their use of rounding their values too early in their calculation thus leading to an incorrect final answer. Similarly part (b) was well attempted with a roughly half split in the use of the sine rule and the cosine rule. In part (c), many candidates assumed a right angle at *M* and many of these also assumed that $\angle BAC$ was bisected. This led to an assortment of incorrect solutions, and an inability to obtain accurate answers in (e) & (f). The minority did prevail, using the cosine rule to produce a correct solution. Many candidates used Pythagoras’ Theorem correctly in (d) but a fair number of these failed to obtain a correct value for *QM* due to their errors in (c). Unfortunately, in part (f), a few candidates did not know what an angle of depression is and so found the wrong angle (usually $\angle AQM$). A majority did appear to know and were able to use a correct trigonometric ratio but, as just mentioned, the accuracy of their final answer was dependent on their success in (c).

Question 11

Weaker students tended to attempt just parts (c) and (d). (a) was generally well done with nearly all of these candidates using f(□3) = 0. A few attempted f(3) which, although it was incorrect, still led to k = -4, but gained the candidate no marks. Few candidates produced an acceptable answer for (b) and these tended to divide the cubic by x^2. Parts (c) and (d) were usually correctly done. Candidates who were successful in (b) were, not surprisingly, successful in (e). Most candidates attempting part (f) chose to factorise the cubic to obtain their solutions and this produced many correct answers. However, a number of these left their answer as a product of factors without extracting the roots, losing all three marks. Some of those candidates who used their graph failed to include □3 in their solutions, collecting two of the three marks available.

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