Principal Examiner Feedback

November 2016

Pearson Edexcel GCSE in
Mathematics B (2MB01)
Higher (Calculator) Unit 3

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GCSE Mathematics 2MB01
Principal Examiner Feedback – Higher Paper Unit 3

INTRODUCTION

Most scripts reflected a modest performance in this higher tier examination paper.

Students appear to have been able to complete the paper in the time allowed.

Questions 1 - 4, 9, 11, 12(b), 13 and 21 attracted a high proportion of fully correct responses. Questions 8, 15, 16, 17, 19(b), 22 and 23 attracted few fully correct answers.

To their credit, students generally showed their working in a clear manner so examiners could give some marks when a correct method was clearly shown but where the final answer was not correct.

Many students would benefit from further practice in rounding numerical answers to a required degree of accuracy.

REPORT ON INDIVIDUAL QUESTIONS

Question 1

This question proved to be a good opening to the paper. Most students scored full marks. Where there was a loss of marks, it was often because a student wrote " $10\% = 600$" as part of their approach to find 12% of 60 000 by splitting it into 10%, 1% and 1%. Students needed to show how to find 10% and 2% of 60 000 to help them get the method mark here. A significant number of students either gave 7 200 or 52 800 (from $60\ 000 - 7\ 200$) as their final answer.

Question 2

Most students were successful with this question through a variety of approaches. The most common incorrect calculation seen was $\frac{20}{32} \times 25$.

Question 3

It would have been good to report that a high proportion of students who sat this paper knew the formula for finding the area of a circle. Unfortunately, this was not the case and many students started with an incorrect formula, confusing the correct one with the formula for the circumference of a circle or using πr or $2\pi r^2$. Of those students who could recall the correct formula, most evaluated the area correctly, though errors in the rounding of final answers were quite often seen. Some students did no more than double the radius.

Question 4

Constructions seen in response to this question were generally accurate and there were many fully correct responses. The most common errors made included using arcs which were 3 cm in radius and which touched at the midpoint of the line rather than intersected at two places, drawing only one intersection above the line and joining this to the midpoint of the line, and drawing appropriate arcs without drawing in the line which was the perpendicular bisector.

Question 5

Part (a) of this question was not well done by most students. Common errors included drawing a line from -2 to the left, using a filled in circle at -2 and indicating a line of finite length which ended at 4. Not all students attempted part (b) of the question. Of those students who did attempt this part, a fair proportion of them got as far as obtaining the value $\frac{8}{3}$ and used this value in their final answer giving $\frac{8}{3}, y = \frac{8}{3} \text{ or } y < \frac{8}{3}$ on the answer line. Only a small number of students gave an integer answer with some of these students giving 3 as their answer. Some students employed a trial and error approach. A surprising number of these higher tier students made basic errors in the manipulation of the inequality. For example, "$4y - y < 7 - 1$" was commonly seen.

Question 6

Students often applied a translation to the shape **A** to score one mark but only a small proportion of students placed the shape in the correct position on the grid. Other types of transformation were seen on many scripts. In response to part (b) of this question, most but by no means all students described a single transformation, usually a rotation. A complete description with the correct centre and angle of rotation eluded most students.

Question 7

This question was a good discriminator. Some excellent clear, concise and fully correct solutions were seen. Most of these were from students who had calculated the number of hours for 4 Speedy pumps to empty the lake and the number of hours for 5 Flow pumps to empty the lake. Where students were less successful a great many approaches were seen and it was sometimes the case that a student could make a start on the problem to score 1 mark but failed to make further progress. A number of students compared the time taken for 1 speedy pump to empty the lake with the time taken for 1 flow pump to empty the lake and so did not fully address what was asked of them.

Question 8

A few students scored both marks for a correct answer to this question. The most common incorrect responses seen were 200 and 8 000 000 ($200 \times 200 \times 200$).

Question 9

This was one of the most successfully answered questions on the paper. The great majority of students successfully found and compared the sale price of a watch in both shops rather than the alternative method of comparing the reduction in each shop. Students nearly always gave a clear conclusion at the end of their working.

Question 10

Some students presented an accurate drawing clearly indicating the correct position of the ship to score all 3 marks. However, this was the exception rather than the rule. It was more common to see students either scoring one mark for marking one correct bearing or no marks at all. A minority of students were confident in using bearings and in using their protractors to draw them.

Question 11

This question was answered well by most students. Answers were usually accurate though there were some cases where answers were not rounded to 2 decimal places correctly. Where students did not apply Pythagoras' theorem, they sometimes calculated the area of the triangle or simply multiplied 5.2 by 6.8

Question 12

Many students scored well in this question, particularly in part (b). There were some clear and concise derivations of the equation in part (a) but this was not generally the case and for many students, this part of the question exposed a weakness in algebra. In part (b) nearly all students substituted suitable values into the equation and in a logical order to find an approximate solution to the equation. The most common loss of marks was either because a student did not give their final answer correct to 1 decimal place or because they wrongly rounded their answer to 3.4 instead of 3.5

Question 13

This was another well answered question. Most students completed the table of values correctly and went on to plot points accurately in part (b). By far the most common loss of marks was because students either joined their points with straight line segments or because they did not join them at all. Many students scored full marks.

Question 14

Only a small proportion of students scored full marks here. Many students multiplied each of the equations through by a constant to ensure that either the coefficients of x or the coefficients of y were such that terms in that variable could be eliminated by either subtraction or addition of the two equations. Unfortunately, students did not indicate whether they intended to add or subtract the equations and accompanying errors often meant that it was not possible to give any marks to reward a correct method. It seemed that most students did not really understand what to do at this stage. Some students did manage to retrieve the situation to some extent by showing a correct substitution of one value as a method to find the value of the other.

Question 15

This question was very poorly answered and most students failed to score any marks. Those students who could identify a correct first operation often failed to execute it correctly. It was common to see incorrect statements such as $f - p = \frac{d}{e}$ and $d = ep - f$.

Question 16

There were very few answers to this question which were awarded any credit. Responses seen were usually either too vague or lacked the detailed steps needed for a proof. Most students appeared completely out of their depth in tackling this question.

Question 17

There were some correct solutions to this question. However, attempts to apply Pythagoras' theorem were commonly seen despite there being no right-angled triangle. Some other solutions were restricted to adding 18 and 6 without any further progress.

Question 18

It is encouraging to report that there were a number of fully complete and correct solutions to this multi-step question. Where attempts were not totally successful, students could often be awarded partial credit for a correct start to the problem. This usually consisted of converting the speed from km/s to mph or for converting the distance to km. There were many possible routes through this question and solutions seen demonstrated elements of many of these.

Question 19

The small proportion of able students who gave a fully correct solution to part (a) of this question usually used the factorisation method rather than that of substituting into the formula. Most students could not identify a suitable method but resorted to trial and improvement or inappropriate manipulation of the equation. In part (b) only a small number of students could either get a correct answer or identify a correct strategy to deal with the equation.

Question 20

Some students could recall the need to consider multiplying the recurring decimal by powers of ten but not many could use a correct combination to eliminate the recurring nature of the decimal. A small number of students gave a clear, accurate and complete solution to score full marks.

Question 21

Many good attempts to this question were seen and a good proportion of students scored full marks for their answers. The weakest answers involved the use of simple interest or finding the interest earned after n years (£1379.24).

Question 22

Many students tried to apply Pythagoras' theorem to the non-right-angled triangle in this question. Only a few students attempted to use the general formula for the area of a triangle in response to being given a value to assign to this. Even fewer students realised that they would also need to use the cosine rule.

Question 23

Many of the answers to this question were restricted to stating an incorrect value in part (a), often 199.5, followed by a comparison of this with $175+24$ in part (b). This could not be awarded any credit. Students who did realise that they needed to consider bounds in part (b) as well as in part (a) often failed to see this through correctly. For example, the values 175.4 and 24.4 were commonly seen. These students could sometimes be awarded some credit for a correct strategy inaccurately executed.

Summary

Based on their performance on this paper, students are offered the following advice:

- practice answering questions involving algebraic manipulation, for example in solving linear inequalities, in changing the subject of a formula and in solving simultaneous equations.

- learn the formulae for the circumference of a circle and for the area of a circle and ensure you know which is which.

- read the specific demands of a question to ensure you round answers to the required degree of accuracy.

- apply Pythagoras' theorem only to right-angled triangles.