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Principal Examiner Feedback

Summer 2014

Pearson Edexcel GCSE
In Mathematics B (2MB01)
Unit 2: 5MB2H_01 (Higher)

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Principal Examiner Feedback – Higher Paper Unit 2

Introduction

It was encouraging to note that most students showed some working for the questions that involved multiple calculations such as Q6, Q8 and Q13. This enabled students to score method marks when the answer was incorrect.

Many students lost marks for not writing complete reasons on the QWC (quality of written communication) Q7. Centres are advised to look at the list of geometric reasons sent to centres to ensure students know what wording to use for geometric reasons. The underlined words on the mark scheme for this question show the minimum requirements.

In general, students responded well to the QWC Q4 by showing all relevant working. There is still, however, a small minority of students who either fail to show working or else fail to give a conclusion where this is appropriate. In questions testing QWC, conclusions must be given as a statement. In Q4 students were asked if Mary would have to stop for petrol on the way to Sheffield. It is not sufficient to just say 'yes'. A full statement is needed with relevant figures.

Students are advised to show working on diagrams where possible. On Q4 markings on the graph would indicate that students had used the graph to make conversions and examiners would be able to accept conversions that were not exactly 5 miles = 8 km if they were readings from the graph that were within a half square tolerance. On Q7 examiners would be able to award marks for angles written correctly on the diagram. Many students did not know how to use three letter angle notations. However if, for example, 50° was on the diagram at angle *ABE* or at angle *EBF* method marks could be awarded. The same is true on Q12.

If students need more working space for a question it is important that they write in the body of the answer space that they have continued on another page so that examiners know they need to send the item to review for someone to access other pages so that the full response can be marked.

Report on individual questions

Question 1

This proved to be a good opening question with the most students scoring all 3 marks. The most common error was to just write down the discount of £150 as the answer.

Question 2

Most students could simplify the algebraic expression in (a). Common incorrect answers were $4e - f$ (which scored 1 mark) and $4e - 5f$ (which did not score any marks).

Again, most students could correctly expand the expression in (b). Here the most common error was to only multiply the first number by 2 reaching an answer of $6x + 5$.

Question 3

Students employed a variety of methods to work out the amount of each ingredient needed to make the dessert for 15 people. By far the best method was to work out the multiplier of 2.5 from 15 ÷ 6 and then to apply this to each ingredient. However many students first divided each amount by 6 and rounded their answer before multiplying by 15. This led to inaccurate answers and far more complicated arithmetic processes.

Question 4

Most students were able to score at least one mark for a correct conversion either stated (e.g. 5 miles = 8 km) or from using the graph and many went on to score a second method mark for using their conversion to convert 240 km to miles or to convert 350 miles or 180 miles to km. Where graphs are used it is advisable to show your working lines on the graph so that the examiner can award marks for correct use within tolerances.

On this question students could score all 4 available marks for use of the graph within a half a square tolerance, for example using 10 km = 6 miles. Students are advised to make their final statement answering the question given and providing figures for comparison and to justify their conclusion. For example many students correctly converted 350 miles to 560 km and then worked out that there were 320 km left to travel but did not then go on to convert 180 miles to 288 km so that a comparison could be made.

Mixing the figures in miles and km was a common error. For example it was not uncommon to see 350 − 240 = 110 miles left so she did not have to stop for petrol.

Question 5

Most students were able to provide the correct answer to at least one of the parts with most students getting at least two parts correct. It was pleasing to note that students made it clear that they were using indices by writing the index number clearly as a power. Most students were successful with part (b) although y^{-2} was seen fairly often.

Question 6

Poor arithmetic was an unwelcome feature of this question. Many students scored all 3 method marks but fell down on accuracy. It was not at all uncommon to see 200 ÷ 40 = 50 and 200 ÷ 50 = 40. Most students who converted 2 metres to centimetres were successful in scoring the first 2 marks. However, those that first found the volume of the container as 8 m^3 struggled to convert this to cm^3 or to convert 16 000 cm^3 to m^3. Others struggled to accurately work out 8 000 000 ÷ 16 000.

Students should be advised, when answering similar questions, to use the method of (200 ÷ 40) × (200 ÷ 50) × (200 ÷ 8) rather than finding the volume of the container and dividing this by the volume of the packet as this method does not always work when the container is not filled completely.

Question 7

This was well answered by many students with many working out that the angle marked x was 80°. However not many students scored the communication mark for providing all 3 reasons that included all the relevant words underlined in the mark scheme. The most common error was to either make angles *EBC* and *EFG* each 65° or to write that angle *EFB* was 50°. These students could only score a maximum of 1 mark for indicating that angle *ABE* was 50° either by writing a statement or putting 50° in the correct place on the diagram. A few students extended *EB* or *BF* and used the rule that corresponding angles are equal. This was also acceptable.

Question 8

The most successful method used was to try to reach a common multiple either by writing down the multiples of 12 and 15 or to use factor trees. Many students simplified the ratio 12 : 15 to 4 : 5 and then wrote that 4 packs of blue paint and 5 packs of white paint were needed. This did not show any real understanding of what was required.

Question 9

Most students recognised that the numbers went up by 2 each time and many were able to access the first mark by writing $2n$. The most common incorrect responses were $2n - 1$ and also $3n + 2$. Some students did understand that the correct expression was $2n + 1$ but wrote their answer as $n = 2n + 1$, losing the accuracy mark.

Question 10

Students were generally able to score at least 1 mark in part (a) generally for writing down 4 terms with at least 3 correct. The most common error was to multiply x by $2x$ and get an answer of $2x$. Students should, at this level, understand that the product of two linear expressions will result in a quadratic expression. In part (b) many students scored at least one mark for taking out a common factor with an answer of $2x\ (2x + 4y)$ often seen.

Question 11

Most students tried to convert the given numbers as ordinary numbers and tended to be successful in this by converting at least 3 correctly which enabled them to score 2 method marks. However a lot of jumbled working was seen with many numbers written with 2 decimal points in the original decimal position and the final position. Credit for correct conversions could not be awarded in this situation. The most common error was to write 34×10^{-5} as 0.000034

Question 12

Most students scored a mark for showing that either angle *OBA* or angle *OCA* was 90°, generally by indicating this on the diagram. However many students lost marks because they did not identify which angle they were finding when doing calculations. It was very common to see $360 - 90 - 90 - 40 = 140$ without any indication that this was a calculation to find angle *BOC*. Just writing 140 in the correct place on the diagram would suffice. Others had no understanding of 3 letter angle notation. 20° was often seen on the diagram for angle *BCO* but then 140° was written in the answer space. Students should be encouraged to write all calculated angles in the appropriate space on the diagram as this would greatly increase the number of method marks awarded.

Question 13

It was evident that many students were not familiar with questions on distance, speed and time that involved more than one stage of working with $210 \div 4 = 42$ as a very common incorrect response. Many others showed that it took 3 hours to travel between Brockley and Cantham but instead of subtracting this from 5 hours, they added it on to 5 hours. These students then went on to find the average speed by writing $(250 + 210) \div (5 + 3) = 57.5$ which could only score 1 mark. Many other students found the average speed by writing $(50 + 70) \div 2 = 60$. However there were many good responses seen with many arriving at the correct answer from correct working.

Question 14

It was really encouraging to note that most students made some attempt at this question with many good attempts showing the total surface area was $82x^2 + 32x - 12$ although the working for this question was poorly set out in many cases. Many students scored at least one mark for finding at least 2 areas correctly (condoning the omission of brackets). The students that attempted to find the volume did not score as they only found the area of one face (generally the trapezium). Others were able to demonstrate they could find the area of one the four rectangles but were unsure as to the correct method for finding the area of the front or back. Many made errors in finding the area of the front (trapezium or the triangles + rectangle) by not dividing their expression by 2. It was good to see that many students demonstrated a fully correct proof.

Question 15

It was surprising to see how many students used a correct method to get an answer of $\frac{14}{90}$ and did not put this answer in its simplest form. There were many good responses to this question generally approached by using a method of $100x - 10x$ or $10x - x$. However, a significant number of students thought that the given decimal was 0.151515... These students were able to access the B mark for the special case. Students should be advised to expand the given recurring decimal to at least 6 figures to ensure they score the first method mark.

Question 16

Many students were unable to deal with the surds. Many of those that could expand the two brackets wrote − 5 as the last term rather than + 5. This led to an incorrect answer of $20 - 10\sqrt{5}$. Many others could not correctly combine the two 'middle' terms writing an answer of $30 + 10\sqrt{5}$ whilst others gave an answer of $30 - 5\sqrt{5}$.

Question 17

Many students recognised that the first step was to find the gradient of the perpendicular. Whilst some were successful, many wrote this as 2 or −2 or $\frac{1}{2}$. This then needed to be used in the equation $y = mx + c$ where $y = 3$, $x = -2$ and m was their gradient. Some substituted in the equation $y = mx - c$ which was acceptable but these students then struggled to adapt their value of c to a correct final answer. A common error shown by students who knew that they needed to use the gradient of $-\frac{1}{2}$ was to write their gradient as $-\frac{1}{2x}$ which could not get the appropriate marks. Centres are advised to instruct their students to write x so that it is clear it is not part of their denominator. Some students plotted the graph of $y = 2x - 5$ using a table of values but generally gained no marks.

Question 18

The final question on the paper was well answered by the more able students although some of these students lost the final mark by writing $\frac{3x}{x+4} = \frac{3x}{4}$ or some other incorrect 'simplification'. The most common incorrect response was to try to 'cancel' the x^2 terms as well as the terms in x.

Grade Boundaries

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