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Principal Examiner Feedback

Summer 2016

Pearson Edexcel GCSE
In Mathematics A (1MA0)
Foundation (Calculator) Paper 2F

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GCSE Mathematics 1MA0
Principal Examiner Feedback – Foundation Paper 2

Introduction

The paper was accessible to all students, with every question attempted by most students.

It was encouraging to note that students showed their working on the starred (QWC) questions. However, students do need to state clearly what they are doing rather than have a mass of calculations all over the page.

It was not uncommon to see trial and improvement methods to find the value of x in Q21 and to work out the value of m in Q23(b). In these cases students either scored all the marks for a correct answer or no marks for an incorrect answer.

Premature rounding led to a loss of marks in some questions. As well as this, approximating without showing where the approximation came from also caused problems.

Most students appeared to use their calculators but there were still some who lost marks through unnecessary arithmetical errors. It was also noted that some students either did not have access to or chose not to use calculators and/ or rulers.

Report on individual questions

Question 1

Most students successfully wrote the number 4726 in words and five million in figures although it was not uncommon to see the latter written as 500 000 or 50 000. Most students rounded 3648 to the nearest hundred correctly. Those who failed to achieve the mark commonly rounded up to 3700.

A significant number of students failed to score in part (d). 7.6 was often written as the second number in the list, and sometimes the first, with the rest being correct. Inevitably some wrote the list in reverse order.

Question 2

The majority of students identified the correct bar and read off the scale proficiently in part (a). Many students did not read or understand the question in part (b) thoroughly, focussing on 'twice the number' instead. These students either wrote Monday and Wednesday as their answer (as Wednesday 8 = 2 × Monday 4) or Tuesday and Friday (as Tuesday 6 = 2 × Friday 3). Several students lost marks by putting 9 and 6 instead of the days of the week. Students who showed working to get a total of 30 often went on to provide an incorrect answer.

Question 3

Part (a) was well attempted with many correct answers. However, a number of students confused line symmetry with rotational symmetry, giving an answer of 0 or 4.

Part (b) was well answered with most students getting at least two correct lines of symmetry and many drawing all 4 lines with no extra lines. A significant number inappropriately used parallel line notation and some students were very careless when drawing their 'straight' lines, as a number of responses seen were drawn freehand.

Question 4

This question was well answered with most students scoring at least 2 marks for an answer with digits 23. However, many of these students converted pence to pounds incorrectly, such as writing 8p as £0.8 which led to an incorrect final answer. There were many errors made where one number was used in error such as using 30 calls and 30 texts. The penalty for this was high as the correct method was not seen for either company. Nearly all students used the first method shown in the mark scheme. When the second method on the mark scheme was used, students very rarely gained full marks.

Question 5

Almost all students gave the correct answers to parts (a) and (b). The most common of the rare incorrect answers to part (a) were $\frac{3}{7}$ or $\frac{7}{3}$ or $\frac{3}{10}$

Most students made a start to part (c), dividing 80 by 5 to get 16. However most students stopped at this point rather than going on to work out how many marbles Jack had after giving some away, only gaining 1 mark. Some students simply subtracted 0.2 or $\frac{1}{5}$ from 80.

Question 6

Parts (a) and (b) were well answered with most students taking successful readings from the graph.

In part (b) the most common errors were answers of 40 or 10 where students had not found the difference to give the amount of fuel added to the tank.

Students found part (c) a bit more challenging. Many found that one part of the journey was 25 and where this was shown, they scored a mark. However, many did not show working. It was not uncommon to see an answer of 80 (from 25 + 30 + 25) without working which meant they could not score 1 of the 2 available marks for 25 as part of their sum. The most common error was to read all end points of the lines on the graph and add them together e.g. 35 + 28 + 10 + 40 + 23 + 15 or just 35 + 10 + 40 + 15. Other common errors seen were 35 + 15 and 35 − 15 as students just used the two end number of litres on the graph and 35 + 30 where students had used their answers from parts (a) and (b).

Question 7

Those students who knew how to convert 5.4 kg to 5400g tended to continue to divide this by 450, scoring at least 2 marks in part (a). However, many either gave a final answer of 12 or divided this by 2 rather than multiplying 12 by 2 to get the correct answer of 24. By far the most common error was to say that 5.4 kg was 540g. Here students then struggled to cope with the 90g left over after subtracting 450 from 540.

In part (b) those students who started with 5.4 × 20 tended to go on to score at least 3 of the 4 marks. However, many did not do this calculation. They calculated 5 × 20, ignoring the 0.4 or just said that the initial calculation was 100 minutes or 1 hour 40 minutes, disregarding the extra 0.4 kg. This meant they could only access 1 mark for adding 90 and 30 to their times. Others struggled with calculations involving time confusing 1 hour 48 minutes with 1.48 or 108 minutes with 1.08 hours, and dealing with time as a decimal.

Question 8

Most students got part (a) correct with the main incorrect response being (5, 1).

Part (b) was well answered. The most common incorrect responses were plotting at (2, 6) or (4, 6) or (0, 2) or (0,3) or (0,4). Those students who did not gain a mark often forgot about it being a rectangle or did not know that the vertices *ABCD* had to go in order around a shape.

Question 9

Nearly all students demonstrated that they recognised the square root sign and knew how to use it on their calculator. Most students coped with the cube function. Those that did not tended to write an answer of 63.

Question 10

Most students understood the mode and got part (a) correct.

The calculation of the mean in part (b) was well done but many students failed to add one of the numbers. As no working was shown in this case or just a number divided by 10 was shown, examiners could not award a method mark as the method was not seen. Others correctly added and then forgot about dividing by 10 or worked out the median or range.

Most students made a good start to part (c) generally for $320 \times 2.4 = 768$. However many went on to divide this by 2.4 before subtracting this from 1000. Many students worked out the space left on the memory card (232) rather than the number of photos that would fit. Those who did do the correct calculation often did not round down their answer to get a final answer of 96

Question 11

Parts (a) and (b) were answered very successfully. The most common mistakes in part (a) occurred when students forgot to draw the last shaded rectangle or simply added pattern 1 to pattern 2 etc and ended with extra rectangles. Many poor drawings were seen where using a ruler would have helped students.

The most common incorrect response in part (b) was 10 and, to a lesser extent, 8

There was a mixture of responses to part (c). Most students recognised that Sue was right and wrote that the numbers were even and 50 was even or that 50 corresponded to pattern number 25. However, some students were not explicit enough. Just saying the numbers go up in 2s is not sufficient as the starting number could be odd.

In part (d) there was evidence that the students muddled the white squares and the grey rectangles in answering this question. The correct answer of 38 was offered by those students who recognised that the number of white squares was 1 less than the number of grey rectangles, then doubled. Many left their answer as 19 failing to multiply by 2

Question 12

Part (a) was correctly answered by nearly all students. Their answer was sometimes accompanied by words with 'unlikely' being favoured. Incorrect responses included 1:6 and a word description only.

Part (b) was answered less successfully. The most common correct answers were 6/6 or 100%. Incorrect answers tended to use terms such as certain, very likely or impossible without a numerical answer.

Question 13

Part (a) was well answered with most students writing 1270 for both marks. The most common incorrect answer was 1070 with many students missing one of the 200 mm sides.

In part (b) most students measured the diameter of the hole in cm but unfortunately many of these students did not put the units with their answer or wrote, for example, 3.2 mm, resulting in no marks being scored. Many students measured the radius whilst others tried to calculate the circumference of the circle.

Nearly all students scored a mark for drawing one of the 90° angles within a 2° tolerance in part (c). Drawing *AD* and /or *BC* tended to be more challenging although there were a number of fully correct scale drawings.

Question 14

Most of the responses to parts (a) and (b) were correct. The most common errors were m^5 and pr^4. A large number of students got part (c) correct although many lost the final mark for trying to 'simplify' their answer of $7x + 3y$ to $10xy$. It was not uncommon to see an answer of $7x - 3y$. Another common answer was $7x\ \ 3y$ with the addition sign omitted which scored just 1 mark.

Question 15

Students should be encouraged to show all calculated angles on the diagram. Many students wrote $180 - 58 = 122$ or $180 - 90 - 58 = 32$ in the space provided below the diagram but did not specify which angle they were calculating so no marks could be awarded. Use of three letters to describe angles in working may have gained some marks but was rarely seen. The most common incorrect response was to put 32° at angle *ACD* on the diagram (which scored 1 mark) and then to think that *CD* bisected angle *ACB* giving a final answer of 32°

Question 16

Many students scored the first mark for one of the two correct fractions. But most of these stopped there, just stating that bag **A** had the greater probability without showing a method to compare their two fractions. A large number of students showed no fractions and gave bag **B** stating that there were more black balls in **B**, clearly not understanding what was required. Some attempted to use ratios but tended not to be successful.

Question 17

Students were mostly able to access the first mark getting at least 2 of the 4 entries that were given in the correct place, and a majority then went on to score all 3 marks. Common errors included 'double adding' the total to get 296 thinking that there were 148 girls and 148 boys or simply poor arithmetic e.g. 42 + 28 = 71. Little working out was shown, either for correct or not fully correct answers. Occasionally the table was used as a data collection sheet.

Question 18

Many students were not able to draw an enlargement of the given shape. However, most students were able to score 1 mark generally for enlarging the vertical and horizontal line correctly.

Question 19

In general, students struggled to work out the length of one of the sides of the square paving stone. Some scored a mark for 180 calculated or, more often, seen on the diagram, but few went on to divide this by 4. Some students tried to find the area of one rectangular slab whilst others tried to find the perimeter.

Students tended to be more successful in part (b) where many found 4 and 12 from 120 ÷ 30 and 720 ÷ 60 but most of these students then found the sum of these two numbers writing 16 as their final answer instead of 4 × 12 = 48

Question 20

Most students understood how to interpret a stem and leaf diagram and could use the numbers appropriately. In part (a) most students knew that the median was 'the middle value' but many were unable to do this accurately with 31 or 34 being a common incorrect response, scoring no marks. Others were able to identify 31 and 34 as being the two middle values, scoring 1 mark, but then were unable to score the final mark for an answer of 32.5 whilst a few even gave their final answer as 2.5 or 14 from the 1 and 4 in the middle.

In part (b) nearly all students who knew to use 47 and 15 got the final answer of 32 correct.

Part (c) was well-answered by most students with only a few giving $\frac{7}{20}$ as an incorrect answer.

Question 21

Most students on this tier struggled to find the value of x. A lot of correct answers were from trial and improvement methods rather than algebraic methods. Students who used trial and improvement methods either scored all 3 marks for the correct answer or 0 marks for an incorrect answer. The most common incorrect algebraic method used was for $2x + 4 = 45$ leading to $x = 10.5$. Others wrote $45 \div 4 = 11.25$ Neither of these methods scored any marks. Students continue to struggle to form and solve algebraic equations.

Question 22

It was pleasing to see that many students were able to make comparisons of all three packs by either finding the cost of 1 bag (in £ or pence) or finding the number of bags of crisps per £.

Students who showed their working using the first method tended to score all the marks or scored 3 marks as they wrote $400 \div 18 = 0.2$ rather than 0.22 whilst those that did not show working but just 0.2, 0.24 and 0.23 could only score 1 mark in total. Students who used the second method often lost the communication mark as they tended to give the medium bag as their final answer as they looked at the smallest of 4.5, 4 and 4.3 rather than the largest.

Question 23

Students did relatively well on part (a) of this question but rarely scored any further Many students were able to substitute the given values into the formula in part (a) and get the correct answer.

However many students did not square h, writing 50 ÷ 1.57 = 31.8, scoring no marks. Others rounded prematurely writing 50 ÷ 2.46 = 20.32... This scored no marks without working as the answer was not within the given range of acceptable answers.

In part (b) there were many trial and improvement methods seen which resulted in an answer of 68 or 68.1 (but not 68.04) which resulted in no marks being awarded. Some were able to write 21 = m ÷ 1.82 but did not then go on to rearrange the equation for m also resulting in no marks. Many others just wrote 1.80 × 21 = 37.8 which did not score. In general, those who gained the method mark tended to go on to get the accuracy mark.

Students tackled part (c) in a variety of ways, the most successful being 1.45 × 1.80 or equivalent. Those who broke down the 45% into 10%, 40% and 5% tended to make errors along the way. Without seeing the method leading to these errors no credit could be given.

It was not uncommon to see 145 × 1.80 = 261 with no further working which did not show any understanding of percentages.

Question 24

Many correct and accurate frequency polygons were seen. There were, however, many students who only scored one mark, generally for plotting at the end values of the intervals and joining the points. However many lost a mark for the correct plots at the mid-intervals without joining the points or drawing the correct frequency polygon but also joining the first and last points. Others had little idea what to do which was demonstrated by drawing bar charts or line graphs or by drawing a polygon shape on the grid.

Question 25

Students should be encouraged to show all calculated angles on the diagram. Many students wrote 180 − 54 − 70 = 56 in the space provided below the diagram but did not specify which angle they were calculating so no marks could be awarded. Many added 54 and 70 to get 124 which scored no marks unless they also said that x = 124. However, most that did write 54 + 70 = 124 then went on to do 180 − 124 = 56 which scored no marks unless they either wrote $<DEF = 56$ or wrote 56 in an appropriate place on the diagram. Those students who did get an angle correct applying their knowledge of parallel lines often did not write an appropriate reason e.g. "$<EAC = 54°$" with "corresponding angles" was often seen rather than "alternate angles are equal". Most students did not score any communication marks as they were not able to supply an appropriate reason involving parallel lines (the colloquial terms Z or F angle were not acceptable). Those that did often lost the final mark for writing "opposite angles are equal" rather than "vertically opposite angles are equal".

Question 26

Whilst a few correct answers were seen, most students were unable to successfully navigate their way through this problem. Most students were able to access the first mark for either 18 × 10 (= 180) or 3.50 × 5 (= 17.50) or both. They then struggled to go any further. Figures used in calculations must be supported. For example, just stating that 4 (or 2) gallons were used without showing either 180 ÷ 45.2 or 90 ÷ 45.2 was insufficient to gain the method mark for conversion. It was rare to see a final answer within the given range for the final mark.

Summary

Based on their performance in this paper, students should:

- ensure that full accuracy is maintained throughout multi-step calculations, only rounding the final answer
- be aware of the key words necessary for geometric reasons.
- show all their working to gain method marks in case their final answer is incorrect and order work showing clear progression of method
- show any calculated angles on the given diagram when solving a geometric problem and/ or be able to define an angle with 3 letters
- understand that a probability must be given as a numerical value not a word.

Grade Boundaries

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