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Examiners' Report Principal Examiner Feedback

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Pearson Edexcel GCSE (9 – 1)
In Mathematics (1MA1)
Foundation (Calculator) Paper 3F

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GCSE (9 – 1) Mathematics – 1MA1

Principal Examiner Feedback – Foundation Paper 3

Introduction

This paper proved to be an accessible paper for all students, and students seemed well prepared. Students were able to at least attempt all questions, with very few blank responses seen; some students were able to gain marks into the mid-grade questions at the back of the paper. A few students appeared to lack a protractor needed for the pie chart in question 12, and this often proved costly for them. However, almost all students did appear to have access to a calculator. It is clear that the solution of problems is becoming embedded into classroom practice as students continue to improve their performance on this type of question.

Report on individual questions

Question 1

Part (i), almost all students were able to access this simple one mark question that required them to subtract. The answer of 43.7 was seen almost on every script.

Part (ii) was also answered well, although some students struggled to work with the fractions as the question required.

Question 2

Another very well answered question with the vast majority of students able to correctly write 3% as a fraction. A few students incorrectly had 10 as their denominator rather than 100, but this was only a very small minority.

Question 3

This question required students to be able to use the square root button on their calculators to evaluate $\sqrt{1.44}$ and again, the vast majority of students were more than able. The required answer was acceptable as either a decimal or a fraction.

Question 4

Question 4 assessed students' understanding of fractions as an operator. Like the previous items most students understood what was asked of them and were able to find $\frac{1}{8}$ by dividing by 8.

Question 5

In part (a) most students correctly identified the solid as a cuboid. Rectangular prism was seen occasionally and gained credit. A few students got mixed up with solids and 2D shapes and incorrectly gave the answer of rectangle.

In part (b) there were typically only 2 answers seen, 8 and 12. The correct answer of 12 was by far the most common, but there were a number who got mixed up between edges and vertices and thus gave the answer of 8.

Question 6

Almost every response in part (a) had the cross placed correctly at $\frac{1}{2}$. In part (b) the correct answers of $\frac{2}{6}$ or $\frac{1}{3}$ were very regularly seen. A small number of students gave an incorrect response of $\frac{1}{2}$ but this was rare.

Question 7

This was the first question that really started to test students with a number struggling to convert between mm and cm. However, many were able to make the conversion, but some then subtracted rather than added. In this case they typically got the method mark for either 188 or 0.06, highlighting the importance of showing their method. Of those who did add, there were a number who failed to get the accuracy mark because they didn't state the correct units with their answer.

Question 8

The first problem question on the paper required students to work with proportion and money to see if someone had sufficient funds to make a specific purchase. It was very pleasing to see how well students dealt with this question, and that is credit to the work done on such problems in centres. A score of four marks was very common. Of those who failed to score full marks it often came down to inefficient methods being used. Rather than using multiplication and their calculators, some students used repeated addition, and whilst there is nothing wrong with this approach it often led to arithmetic errors and therefore loss of marks. A small number of students failed to give a final conclusion to go with their correct figures, but this was far less common than it has been previously.

Question 9

It is clear that some students are not familiar with their 2D shapes. There were a number of incorrect answers seen, such as parallelogram, rhombus and even right angled triangle. In part (b) a large proportion of students correctly identified the correct two shapes.

Question 10

This simple reflection was done really well by students, with again almost all students able to draw the correct reflected shape.

Question 11

This second problem question caused significantly more issues than the first for students. A good number were able to start to work with percentages and realised that the proportion of men was 70%, however that was as far as many were able to get. Common incorrect methods included finding either 30% or 70% of 28, rather than realising that 70% related to the 28 women. Of those who were able to complete the problem, it was often by finding the number of men first rather than working from 70% straight to 100%.

Question 12

It is really pleasing to see how many Foundation Tier students are able to access pie charts. A great number were able to score three marks for a complete correct chart. Those who failed to gain full marks generally lost marks by inaccurate drawing of angles, and came after students had shown their understanding of proportion and were able to correctly calculate the sizes of the three angles. Some students used a method of trying to find percentages for each category, but this was unable to gain credit until they then found percentages of 360° , which most using this method unfortunately didn't.

Question 13

Another problem question and another one accessed well by the students. Most were able to gain at least two marks by finding the total cost of the calendars bought. Many students then struggled to find the number of calendars, possibly as this meant dividing by a decimal (even with a calculator); many multiplied by 0.9 instead of dividing. However, there were a good number who were able to take the final step and get to the 50 calendars.

Question 14

This probability was generally answered very well. In part (a) most students got the correct answer. However, there were a significant number of students who put the correct value of 0.3 in the table, but then had a different incorrect value on the answer line. In this case the answer line takes precedence and so these students lost the mark. Part (b) was answered well again with the only answer seen other than correct one was typically 3. In part (c) a good number of students were able to answer this common question. Those who went wrong either incorrectly interpreted the table and found $\frac{1}{4}$ of 60, or divided by 0.2 rather than multiplied.

Question 15

This problem divided students, but most were able to get some credit for listing multiples of 3 and 5. Those who gained no marks typically divided 100 by 3 and then divided 100 by 5 and added the two answers. The student who had success normally worked by finding multiples of both 3 and 5 and identifying the common multiples. Very few students attempted to divide 100 by 15.

Question 16

Another familiar type question, and one in which most students gained at least one mark for writing the correct unsimplified ratio. It is clear however, that many students do not know how to simplify ratios and as a result they came up with a variety of incorrect ratios, or they didn't simplify fully, often resulting in answers like $90 : 3$.

Question 17

Many students got confused in their working with this question, with many completely missing part (a) and simply going on to attempt part (b), often with working in part (a). Those who attempted part (a) had mixed results. A good number failed to address the two un-labelled sides resulting in an expression of $7x + 3$ rather than $10x + 6$. Of those who did deal with CD and DE most went on to gain all 3 marks, although some lost the third mark by failing to link the $10x + 6$ with 18. Part (b) was answered very well. Many of those who didn't get two marks were able to get the first mark with a correct first step to solve the equation.

Question 18

This problem was generally answered well. There were some failures seen in the attempts to find 20% and some students subtracted rather than added their percentage. The third process mark was the most commonly awarded for those students who knew to subtract the deposit after increasing the price. There was also a special case for those students who missed the percentage change altogether but knew to subtract the deposit and then divide by 10.

Question 19

Many students seemed very unfamiliar with showing inequalities on a number line. There were various errors seen. It was common to see no circle at all at 4, or a vertical line, or for the line to terminate at a second "circle" rather than continuing to the left. Some students also dealt with the inequality as "greater than", rather than "less than". Part (b) showed up lots of misconceptions. Common mistakes were to have the 7 missing or to include the 3. This meant that students who made both these mistakes gained no marks. However, it wasn't uncommon to see values completely outside the range of the inequality. Part (c) showed a level of algebra that many at this tier struggled with. It was common to see unsuccessful trial and improvement methods as a method of solution. It was also common to see students add x rather than subtract or to 'add' the x and number terms together. Many of those who were able to find the critical value of 6, then failed to give their answer as the correct inequality.

Question 20

Rounding to a given number of significant figures appeared to be a struggle for many students, with many giving answers of a completely different magnitude. Time spent on the understanding of what significant figures are would be well spent for centres. Part (b) assessed understanding of the order of operations and the ability to use their calculators. Most were able to gain at least one mark for one of the suitable intermittent values or for a correct value given to less than 4 decimal places. It is important that students read the guidance carefully as this question required all the figures on the calculator display to be written down. A common incorrect answer seen was 0.78692... where students took the square root of the whole fraction instead of the denominator only.

Question 21

This problem was a difficult one to access, with most unable to gain more than one mark. This was normally for finding the difference of 638 or for dividing 883 by 245. With either of these methods, most students then struggled to know what to do, with it being common to see them trying to turn 638 into a percentage by dividing by 10 or 100. It is possible students are not used to seeing percentage changes of more than 100%.

Question 22

Typically in part (a) the positive x values were correctly evaluated but the negative one wasn't. When it came to plotting, the scale of one square = 0.5 really challenged students so many who gained one mark in part (a) then failed to get one in part (b) because they made mistakes in their plotting. Almost no students understood what part (c) was actually asking and as such normally left the response blank. In general, it is apparent the foundation students need greater exposure to quadratic graphs and in using a quadratic graph to solve an equation.

Question 23

This question was generally poorly done. Few understood how to find a percentage from the chart. Typically, students tried to build up a percentage to match their reading from the chart, but with very limited success.

In part (b) many were able to gain one mark for extracting the correct frequencies from the graph (although the scale caused further issues for some), but couldn't then progress further. Of those who knew to calculate fx many struggled to extract the correct midpoints, and as a result were unable to get to the final solution.

Question 24

Many students struggled to deal with speed in any correct way, normally seen by incorrect operations using distance and time. The mark scheme did allow flexibility, until the final mark, with how students dealt with the conversion between minutes and seconds. It was apparent from working seen that many students didn't really know what values they had and what values they were trying to calculate, on top of which, when the formula was stated, it was often wrong. In part (b) however, many students realised that an increase in speed meant a decrease in time. It was the clarity of their answers that sometimes let them down. To gain the mark it had to be clear that students were talking about time rather than a change in speed.

Question 25

This question proved to be a significant challenge to the vast majority of students. The only mark that was accessed with any regularity was the first mark for dealing with the ratio to find the missing angles. From that point on, only a very few students were able to correctly apply trigonometry to further their solution.

Question 26

The final question on the paper is a standard arithmetic sequence question, and

many students were able to access one or both marks. Common incorrect answers were $1n - 6$ and $n + 6$.

Summary

Based on their performance on this paper, students:

- use efficient methods when working with proportion, such as the unitary method, rather than complex, and often incorrect, build up methods.
- come to exams fully equipped to be able to answer any question, including bringing a protractor, ruler and pair of compasses, along with their calculator.
- spend time working with significant figures, to understand their meaning and how to work with them.
- continue to work on the new Foundation content such as trigonometry to be able to access these marks.
- check the suitability of answers given for example, in question 7, where common wrong answers of 2.44m or 7.88m are not reasonable for the height of David.