Principal Examiner Feedback

Summer 2016

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

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GCSE Mathematics 1MA0
Principal Examiner Feedback – Foundation Paper 1

Introduction

Students appeared to be well prepared for this paper with work attempted throughout and very few blank responses seen.

It was pleasing to see that students were prepared to show full working although on occasions this could be somewhat disorganised. For longer questions, students need to be encouraged to structure their working, the best would effectively add a commentary by stating exactly which unknowns were being calculated at each stage. This was particularly helpful for questions set in a functional context such as Q13 finding the total cost for tea and coffee in a café.

As this was a non-calculator paper, it was inevitable that a student's ability with arithmetic would be a limiting factor on performance. One area of general weakness was with division; it was common to see division calculations attempted by a build-up method of repeated addition. Centres need to ensure that students are confident with the more efficient methods for calculation.

Throughout the paper there were questions where students did not answer the actual question set. This was particularly apparent where they were asked for a comparison. A good strategy to be encouraged would be to reread the question stem as a final check that the final answer is answering the actual question. Similarly, discussion of good checking techniques could highlight the need to make sure that correct units are always given when needed to accompany numerical answers

Report on individual questions

Question 1

Students were very successful with all parts of this question with very few errors made.

Question 2

Students making errors on part (a) generally used the numerator and/or denominator digits of $\frac{1}{2}$ to form their decimal answer giving 1.2, 0.12 or 0.2

In part (b) the most common error, made by nearly half of students, was to give $\frac{1}{3}$ instead of $\frac{3}{10}$ as the conversion for 0.3

About two thirds of students gave the correct 80% for 0.8 in part (c) with the vast majority of the remainder giving 8%

A variety of methods including formal and various jottings were used by successful students in part (d). Inevitably there were many arithmetic slips but some incorrect answers involved errors with the placement of the decimal point, typically giving 5.76 rather than 57.6

Half of students correctly subtracted fractions with the same denominator in part (e) and correctly simplified their final answer as required. Some students did not heed the requirement to simplify and others made errors doing so. A surprising number of students unnecessarily attempted to find a common denominator by cross multiplication leading to $\frac{84}{144} - \frac{36}{144}$
This suggests a reliance on this particular method without acknowledgement that there may be a far simpler approach for many pairs of denominators.

Question 3

Students were far more successful recognising congruent shapes in part (a) than similar shapes in part (b). It would appear that they were not fully familiar with the mathematical meaning of the word similar with those making errors choosing shape D rather than the rotated shape B. Students need to be aware that they should be checking for an actual enlargement and use the grid squares to check that an identified scale factor has been applied consistently.

Question 4

Students added 3 digit numbers with confidence in part (a) although there were some arithmetic slips made. The alternative method of using differences was rarely used. Some students added an incorrect number of zeros in an attempt to acknowledge that the figures given were for thousands of visitors. They need to be aware that a clear conclusion was essential for the award of the final mark in this starred question, for example, just circling one year did not suffice.

Parts (b)(i) and (c) which involved reading the timetable were very well answered but part (b)(ii) involving the calculation of a time interval, less so. When candidates attempted to find the difference between the two times using a column subtraction approach they made errors effectively assuming 100 minutes in 1 hour or with the actual subtraction. Use of a time line proved far more successful where any working was actually seen.

Question 5

Students were very successful identifying the correct word "unlikely" to describe probability in part (a) with just a few giving "likely" instead. Students were very successful dealing with the zero probability in part (c) whereas more errors were made identifying the probability of a red counter as $\frac{1}{2}$ in part (b). Most errors here involved placement of the cross somewhere between $\frac{1}{2}$ and 1

Question 6

Students generally understood the special offer in part (a) and were able to select the correct operations to calculate the difference. There were, however, often arithmetic errors with some struggling to find the difference between 126 and 96, typically giving 20 as their answer. The vast majority of students were able to correctly list all six combinations in part (b) and usually did so in a systematic manner which helped to prevent duplication or omission.

Question 7

Just over a half of students correctly named the parallelogram. Although a wide variety of misspellings were evident these generally were recognised as worthy of the mark. Incorrect responses included rhombus.

Students were successful with cuboid sketches although presentation was very variable indeed. Encouraging students to use a ruler would probably help them ensure that all faces did have pairs of parallel sides although some leniency was given in this respect. Rectangles were seen along with incorrect 3D shapes such as cylinders, cones and spheres.

Question 8

Solution of the simple equations in both parts (a) and (b) caused few problems. Where errors were made in part (a), students had either subtracted 3 from the right hand side (12) rather than adding to give an answer of 9 or gave the answer 4 perhaps from dividing 12 by 3. Similarly, in part (b), answers of 25 suggested students had subtracted 5 from the right hand side (30) rather than dividing.

Formal algebraic solution of the equation in part (c) was often replaced by just calculation using the inverse operations to show 13 – 7 then ÷ 2 Some students gave the answer 6 or 13 even if they had reached the correct 3. Students need to take care to give the actual value of the unknown even if they show an embedded solution or carry out a check of a found value.

Weaker students interpreted 2w as being 2+w typically leading to an answer of 4

Question 9

Incorrect answers for this question usually occurred as a result of confusion between area and perimeter. Many students resorted to counting squares rather than formal calculation and most dealt with the half squares with confidence. Clear labelling on the actual shapes themselves often helped and where calculations were used many students drew a rectangle to enclose the triangle part of each shape. This was a starred question but many students with correct numerical work failed to get the final mark which was awarded for correct units cm^2 or square given with the answer 1

Question 10

Students were more successful identifying a factor of 42 in part (a) than multiple of 22 in part (b) Students appeared to understand the meaning of factor with the most common incorrect answers being 4 or 8 but for the multiple, another factor of 42 was typically given. Just under half of all candidates gave a correct set of 3 numbers to complete the statement in part (c).

Incorrect answers most often involved the first 2 numbers where the division part of the calculation was often given in the wrong order, for example 4 ÷ 8 × 6 rather than the correct 8 ÷ 4 × 6

Question 11

Part (a) was generally well answered with many students who did not get the full 3 marks still picking up 2 for showing a complete correct method or getting an answer of 20, the hours worked during the week. Students would be well advised to reread the actual question to make sure that their answer matches it – in this instance they would remind themselves to add the 4 hours back on to the 20 calculated for the rest of the week, Monday to Friday. Many of the students who failed to score any marks had not realised that they needed to subtract the £40 for Saturday first and instead proceeded to attempt to divide £180 by 7. This was one of several questions where a lack of skill with division hampered accuracy. Those that used cumulative addition as a method of division were not as successful as others who worked from knowledge of $7 \times 2 = 14$ to deduce that $140 \div 7 = 20$

Students had far less success with part (b) with only a minority offering the correct simplified expression 35e. Some made a little progress and offered 7e but many others clearly did not understand the meaning of the word expression. Some attempted numerical work, often using information from part (a) or gave an equation.

Question 12

There were many good attempts at this question where students were confident in identifying the correct operations to use. Issues arose with accuracy of multiplication for 330×12 and many lost the final mark through failing to give units. A key part of this question was the need to convert between litres and millilitres. Most students knew the correct conversion factor but would be well advised to choose the unit that avoids decimals, here millilitres, when deciding which unit to work with. There were a few students who used $1l = 100\text{m}l$.

Question 13

Nearly a third of students were able to organise the information required in part (a) and work accurately to achieve all 5 available marks. As with some other questions, difficulties arose with division, particularly with $500 \div 160$ for the number of boxes of tea required. The best work was well laid out with a clear structure which enabled the student to follow their own working and avoid arithmetic slips. Students need to consider as a final check whether their answer makes sense in the context given – there were some very unrealistically high total costs offered as final answers.

Students were very successful indeed in part (b) with virtually all work involving at least one step of a correct method. There were some arithmetic errors, with either step but consistently clear working meant that the method marks were still regularly awarded.

Question 14

Just under half of students used the conversion graph correctly in part (a) with the most common incorrect answer coming from a scale misreading to give 4.9. Successful students often showed markings between 0 and 5 along the °C axis, some went as far as to number their marks. In part (b) again about half of students had some success reading the graph but relatively few followed this with an appropriate comparison to describe the relative temperatures. For this starred question, it was essential for the final comparative statement to not only include correct and consistent units but also make a reference equivalent to the fact that Dave's freezer was warmer than the recommended temperature.

Question 15

Over half of students gained the full 3 marks available for giving a correct data collection sheet with 3 columns. For those awarded part marks, it was the tally column that was most frequently missing. Some students did misunderstand the question and offered a questionnaire question with response boxes instead. When students are taught techniques for checking through a completed examination paper, they could be reminded to compare questions – here the presence of a questionnaire question later in the paper may have been a reminder that a data collection sheet would be different.

Question 16

Students found part (a) straightforward although a few forgot to subtract the total for other spending from 100 so gave 70% instead of the correct 30% for rent. Although students are regularly asked to find the percentage of an amount without a calculator as in part (b) many do not show any method worthy of the award of a mark in the event of an arithmetic error. Centres should be aware that the operations used to get values must be seen to award marks if the values themselves are incorrect.

Question 17

Students appeared well prepared for this question. The provision of a partly completed table of values and axes helped ensure that well over half of students gained full marks. Occasionally, students plotted the points correctly but failed to join them with a straight line. This question was another one where good checking strategies could be used to identify errors. When points plotted did not form a line, not only could the appropriate points themselves be reviewed but also the matching table entries in part (a).

Question 18

Many students were able to calculate the size of the angle for Megan Wells but a significant proportion failed to proceed on to give the actual fraction for this sector. A final check read of the question could have picked up the crucial word.

In part (b), students who realised that Ellen's proportion of the votes was represented on the pie chart by a right angle invariably went on to calculate the answer successfully. Those who failed to realise that Ellen received $\frac{1}{4}$ of the votes did not carry out the straightforward calculation of 4500×4 but instead attempted a much more complicated, and often unsuccessful attempt, to calculate individual votes. Students could be encouraged to refer to the number of marks available to guide them to using a simpler method for questions attracting just 1 or 2 marks.

Question 19

Identifying the number of vertices and faces did prove a challenge for many students in part (a) with incorrect answers for vertices given by just over half of students. Successful students often indicated evidence of counting carefully on the diagram with, for example, vertices circled and faces ticked.

The vast majority of students made some attempt to draw a net in part (b) with only a few giving a 3D diagram instead. About one third of students managed to draw a correct net but others had too many or too few rectangles or used alternative polygons, notably octagons. If students had readily connected their answer for the number of faces in part (a) to the number actually drawn in part (b), some errors could have been avoided. Students should be encouraged to use pencil for all diagrams as many used pen and had to resort to crossing out errors made.

For part (c), many students did not remember the formula for the volume of a prism nor refer to the formula sheet to find it. It was very common to have 30 squared, presumably due to the units given with the 30 cm^2 area of the cross-section in the diagram. Around a half of students picked up at least 2 marks for 750 calculated but over half of these failed to secure the third final mark for giving correct units – these were either omitted altogether or cm^2 given instead. Students should be reminded to write numbers clearly, especially if they are indices.

Question 20

Just over half of students dealt with indices correctly in part (a) with incorrect attempts usually showing indices multiplied rather than added to give p^{10}. The subtraction in part (b) caused problems and so only a small minority gained both marks although many did secure a mark for expanding at least one set of brackets correctly. The majority of students did not understand the demand to factorise in part (c) but where they did it was usually done successfully.

Question 21

In part (a), many students successfully gained a method mark for showing the required fraction $\frac{5}{8}$ but then did not know how to use this to estimate the number of times Beth would get a C. A common error was to divide 400 by 5 rather than 8. Some students used an equivalent fractions method to scale up from $\frac{5}{8}$ to $\frac{250}{400}$

Students found part (b) more challenging than (a) and when they initially attempted to divide 300 by 80 many used the demand for an estimated probability as licence to round at this stage up to 4 and hence reach a final answer of 64 rather than 60. Successful students were often able to recognise $\frac{16}{80}$ as equivalent to $\frac{1}{5}$

Question 22

Some students understood reflection in part (a) but not where the line $x=-1$ should be. They were able to get a single mark for a reflection but only a minority gained both marks for a completely correct transformation. Students had slightly more success with the rotation in part (b) but, again, although many understood the nature of a rotation, it would appear that using the centre of rotation to ensure the correct position was found to be more challenging.

Question 23

In part (a) many students gave at least one correct criticism of the questionnaire question but did not gain both marks as explanations were sometimes vague or the same point was used twice. Of those offering correct reasons, the majority of students were aware that the question did need a time frame and understood that the responses were vague but some were unable to communicate this well. Students need to practise writing down explanations using appropriate key words such as time frame. A common mistake was to say there were not enough option boxes without explaining that they needed to be exhaustive and cover all possible options.

In part (b) most students were able to write a question with a time frame but many wrote questions about the quantity of crisps purchased rather than frequency. Some did not give exhaustive response boxes particularly when a week was used as a time frame and the upper limit of 7 was given without acknowledgement that more than one purchase could be made per day. There were also errors with overlapping response boxes.

Question 24

Just under half of students gained at least one mark on this question but only a minority reached the full 5 marks. Common errors stemmed from working out dimensions of the floor incorrectly. Many students correctly used 2×2.5 or 2.5×6 but then incorrectly added on 10×6 or 5×6. Students could be encouraged to show the methods used to find missing lengths and show calculated lengths on the diagram. In this way marks for a correct method can be awarded even if the final answer is incorrect. A minority of students worked out the perimeter of the shape instead of the area. Some innovative solutions involved splitting the floor area into ten 5 m^2 rectangles to conclude that 10 litres would needed.

Summary

Based on their performance in this paper, students should:

- structure their working
- ensure that they are are confident with the more efficient methods for calculation, especially division
- ensure they answer the question that is set and consider carefully the appropriateness of their answer
- show a method to calculate missing lengths from a diagram then write these on the diagram
- learn the meaning of mathematical terms such as vertices, edges, congruent and similar
- practice efficient methods to add and subtract fractions, i.e. use the LCM of the denominators as a common denominator.

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