Examiners' Report
Principal Examiner Feedback

Summer 2019

Pearson Edexcel GCSE (9 – 1)
In Mathematics (1MA1)
Foundation (Calculator) Paper 2F

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Summer 2019
Publications Code 1MA1_2F_1906_ER

GCSE (9 – 1) Mathematics – 1MA1
Principal Examiner Feedback – Foundation Paper 2

Introduction

The vast majority of students seemed to be entered at the appropriate level and coverage of the syllabus was fair although it appeared that some topics had not been covered by all students, in particular, loci (Q19), inequalities (Q20), trigonometry (Q24) and error intervals (Q25).

Presentation of work was on the whole very good and few scripts proved difficult to read. Students seemed well practised with question in context. It was also pleasing to see students clearly setting out their working when solving problems. However, students often failed to show working when finding percentages or fractions of quantities, clearly using their calculators. This was fine when results were correct but method marks were lost when not.

Report on individual questions

Question 1

The correct answer $\frac{75}{100}$ or $\frac{3}{4}$ was the most common seen with very few incorrect answers.

Question 2

Again, most students gained the mark here; a small minority thought that –1 is smaller than −3.

Question 3

Only a very few students made any errors in this question. Incorrect factors of 9 and 10 were sometimes seen. A few students listed multiples of 15 by mistake.

Question 4

The correct answer was by far the modal response although some students did try to round or truncate 1.756 This was acceptable provided the correct answer had been seen in the working. A number of students carried out division by 100 giving 17.56

Question 5

The correct value for two million was usually seen although the omission or addition of 0s was common.

Question 6

Whilst many students gained at least two marks, and often three, it was alarming to see errors in arithmetic on a calculator paper. Some students failed to note that there were two coffees purchased and results of 4.35 (10 – 2.75 – 2.9) were common. A significant number of students, having correctly calculated Dave’s change, said that Dave was not correct or gave no final decision, clearly not reading the question carefully enough.

Question 7

This question was not well answered; $y = 7$ and $7 + y$ were the most common incorrect answers seen.

Question 8

Parts (a) and (b) were generally well answered. In part (a) a common error was to leave a multiplication sign in the answer, for example, $7 \times ab$ and in part (b), incorrect answers of $3y$ and $y3$ were often seen. Part (c) was poorly answered although many students were awarded one mark usually for either a correct numerator or a correct denominator. The most common mistakes made were either to simply count the number of each variable, for example, $\frac{3ef}{2e2f}$ or to sum the powers, $\frac{e^3 + f}{e^2 + f^2}$ both of which received no credit. An answer of $e^1 f^{-1}$ was given full marks although writing terms with an index of one is not to be encouraged. Cancelling of terms in the original expression was a correct method but this had to be carried out completely to gain any credit. The partially simplified answer of $\frac{e^3 f}{e^2 f^2}$ was very common and gained one mark. Another common incorrect answer was $e^5 f^3$, where students had clearly just counted the number of each variable.

Question 9

Both questions in part (a) were usually correctly answered.

In part (b), a great many students failed to use the ratio of the numbers of records sold on Wednesday to the number of records sold on Thursday. The most common approach was to divide 36 by 8 (= 4.5) leading to an incorrect pictogram. Some students identified 4 and 32 but only in their attempt to find the number of 8s in 36. This gained no credit; the 4 and 32 had to be clearly seen as a result of dividing 36 in the ratio 1 : 8. It was common to see pictograms with the correct symbols reversed for Wednesday and Thursday, indicating that some students had not read the question carefully enough. Very few students followed an algebraic approach and equations such as $x + 8x = 36$ were rarely seen.

Question 10

The most common error here was to get the inequalities the wrong way round. Some said that 4 + 7 was less than 103 – 92. Most students gained at least one mark, usually for $2^2 = 2 \times 2$ and one other correct sign.

Question 11

Although a correct answer of 23 was often seen, many students are clearly unable to evaluate expressions by substitution, particularly when negative values are included. 3×-4 was often seen written as $3 - 4$ leading to an incorrect answer of 34 (35 – 1). Many students ignored the negative sign and simply worked out $7\times5 + 3\times4$, 47 being a very common incorrect answer. A number of students were unable to deal with the addition of a negative number and incomplete answers of $35 + -12$ were not uncommon; which is a concern especially given that this is a calculator paper. Only a very few students wrote an incorrect substitution of 75 – 34 or 75 + 34. Some weaker students wrote 7 + 5 + 3 – 4 = 11, scoring no marks.

Question 12

Part (a) was usually answered correctly.

In part (b), although generally well done, many students confused time notation with decimal notation and incorrectly wrote 9.00 – 7.22 = 1.78 This gained one mark for clearly showing the intention to find a time difference. However 1.78 or 2hrs 38mins were often seen without working and these gained no credit. Some students gave an answer of 1.38 or 1:38 showing an actual time and not a length of time. This gained one mark with or without working. Some only worked out the minutes at 38 with no regard for hours; this gained no marks.

Question 13

Many students answered this question successfully. Students who recognised that the length of the side of each square is 2cm generally went on to get full marks. Some students took the whole diagram to be a square whilst some found the area, usually in shaded squares (30) A few students measured the length of the square (1.7cm). Others divided the length (12) by the number of squares (9). Some students misread the question and thought the whole shape was a square which resulted in a wrong answer of width 12. The majority of students either scored full marks or zero marks in this question.

Question 14

This was a very poorly answered question. Many students were able to write a ratio equivalent to 4.5 : 2.25 but rarely in the required form.

Question 15

Although a few students did work with perimeter instead of area, the vast majority gained at least one mark for 90 × 60. Many, failing to read the question carefully, then simply found the area of the garden where flowers are grown. It was however pleasing to see so many fully correct solutions. Many used non calculator methods to find 40% (or 60%). Some found 40% or 60% of **both** dimensions as opposed to just one before finding the area.

Question 16

In part (a), it was rare to see both parts answered correctly. B was often identified as the least likely coin to land on Heads but A and D were very common choices for the most likely.

Many students correctly said that Julie was wrong in part (b) but their reasoning varied widely. Simply saying that coin C was biased was insufficient since this was given in the question. It needed to be clear that the student was referring to the probability of the $\frac{1}{3}$ given in the table. Students using decimal or fraction equivalents for $\frac{1}{3}$ often made errors in the conversion; 30% was a common error. A number of students referred to even chances or 50-50 chances or ‘odds’ rather than using the correct probability language.

Part (c) was often answered well. Many students tried to convert 0.033 to a fraction or a percentage usually making an error in their subsequent working. Many did not understand the use of the word “estimate” in the context of probability and believed they were required to round off the numbers before calculation. Students who found the correct answer of 132 and then rounded to say 130 were not penalised, provided 132 was seen. A number of students were not explicit in the use of 0.033 and so any rounding made (eg. 0.03) without first writing 0.033 was given no credit.

Question 17

There are many ways to start to solve this problem. Many gained two marks usually for correctly finding the number of calories in the 150g of yogurt; the calculation for banana was a little more demanding depending upon the process chosen. A significant number of students found the "correct rounded" answer from simply 'playing' with the numbers in the question, eg. 84 – (100 – 60) + 87 + (150 – 100) = 181 This gained NO credit. A number of students had no appreciation of proportion as a multiplicative relationship. Those that began with 100/87 = 1.14 received one mark for working with proportion, but they nearly always proceeded with multiplying by150 rather than dividing, depriving them of any further marks.

Question 18

It was pleasing to see so many students gaining at least two marks for working out the number of parts produced by either of the machines; machine B (520) being the more successful. Many then went on to gain full marks. Simply converting hours into minutes was not seen as a sufficient start in solving the problem and no credit was given just for this. The most efficient process for each machine was to work out the number of parts made each hour, 36 for machine A and 52 for machine B, students working along these lines usually went on to give a fully correct solution. Mistakes were made by many when working out the number of parts made per minute or the time taken to make one part. Some students, failing to carefully read the question, mixed up the values and therefore were unable to gain any credit.
Many students were happy saying there were 4 lots of 15 minutes in an hour and successfully getting 52 for machine B, but did not apply the same reasoning for lots of 10 minutes in an hour for machine A. 60 × 12 = 720 was a common incorrect answer for machine A.

Question 19

The vast majority of students did not understand how to draw the locus of points a given distance from a point and so it was rare to see attempts at arcs drawn with point A as the centre. Often points were marked at a distance of 6 cm from A. This gained no marks other than the M1 for using the scale (180 ÷ 30) correctly. This was the only mark gained by many students who failed to draw any loci on the diagram. Clearly a lot of students had no concept of loci either not attempting the question or simply shading an area with no defined boundaries. However, many students were able to score at least two marks for a correct line segment drawn 5 cm from the line BC. Sometimes this was achieved by drawing a 'table' with one side 5 cm from BC. Many students shaded a small rectangular table in the middle of the region.

Question 20

Both parts of this question were poorly answered. In part (a), correct manipulation of the inequality was rare although some did show an intention to subtract $11n$ from both sides. However, many chose wrongly to subtract 6 from both sides. Algebraic methods did sometimes lead to $n = 2$ for the award of one mark. Sometimes this value was found by trial and improvement methods but this method often led to an incorrect answer of $n = 3$.

In part (b), very few students solved the two inequalities and values of – 5 and 1 were rarely seen. The most common attempt was a line drawn between – 2 and 4 sometimes with the correct circle notation, gaining one mark. There were several attempts to select integer values satisfying the inequalities but this rarely resulted in any credit being earned. Some students put arrows or crosses on the number line showing a complete lack of understanding of the correct convention.

Question 21

It was pleasing to see so many correct graphs drawn, although it is still a surprise that so many students plot the correct points and then fail to join them up, denying themselves of an easy additional mark. Incorrect points plotted were usually the inability of some students to work with negative numbers. Disappointing also, to see that those with one or two incorrect plots failed to realise that a straight line was the correct answer. A few students drew only part of the line, failing to go completely from $x = -2$ to $x = 4$. Some students used the – 2 and 4 to mean co-ordinates and plotted them. A number of responses saw the students confused due to the difference in scales on the two axes.

Question 22

Part (i) was answered well with many students correctly finding one third of 195. Some used 'build up' methods but too often this stopped at an answer of 60 out of 180. Many weaker students simply subtracted 30 from 195 showing a lack of understanding of the concepts involved. Some students recognised that a third of the students had chosen the Theme Park, but then used 0.3 or 0.33.

The marking of the second part of this question was eased and credit was given to any sensible assumption that could have been made. The accepted assumption needed to be based upon the sample being representative of all 195 students. Many students simply explained their method by which they worked out their answer to part (i).

Question 23

It was pleasing to see many good solutions to this question. There was, however, some misunderstanding of what was required. Some found the number of cups required to fill the whole container (2 marks maximum) and some found the number of cups needed to fill the final third of the container (3 marks maximum). The final accuracy mark was often not gained through not rounding down to a number of completely filled cups. Incorrect conversions between millilitres and cubic centimetres were condoned if the process was correct. A number of students converted $\frac{2}{3}$ to a decimal or a percentage. This was accepted provided the conversions were correct to two significant figures. Often weaker students worked with surface area or perimeter or found 2/3 of 275 and thus gained no credit.

Question 24

This question was very poorly answered suggested that many students had not covered trigonometry as part of their course, or were insufficiently confident in the application of trigonometry. Many tried simply using the numbers in the question in a variety of incorrect calculations. Students with some knowledge of trigonometry usually selected sine as the function to use, although cosine and to a lesser extent tangent were sometimes their choice. The correct quoting of sin 38° was usually followed by a fully correct solution. Some students however, having their calculators set on an incorrect mode, were unable to score full marks. Correct answers written in the body of a script, and then rounded or truncated incorrectly, gained full credit. Less able students often worked out the missing angle and gave that as their answer rather than finding the side as required.

Question 25

Only a very few students gained the full two marks in this question. Some did earn one mark for one correct entry, usually 8.3. Near misses included answers of $8.25 \leq y < 8.35$ indicating some understanding of error intervals but from a rounded rather than a truncated number.

Question 26

This question was poorly answered with the majority of students starting their solution by dividing £360 into the ratio 2 : 7 No marks were available after this initial error. Trial and improvement methods sometimes lead to a correct solution but those working with the correct ratio of 2 : 7 : 3 : 3 usually found the correct answer of £168. A common misconception led to a ratio of 2 : 7 : 3.5 : 3.5 where 1.5 had been added rather than been used as a scale factor. Algebraic approaches were rarely seen and were often error strewn when attempted. A few students used 6 as a total ratio for C and D and incorrectly got the 'correct' answer by using 1 and 5 or 5 and 1 instead of 3 and 3. This gained NO marks.

Question 27

Understanding of standard form was good. Many students earned at least one mark, usually for a correct answer to part (b).

Question 28

Both parts of this question were poorly answered. In part (a), 21 (15 + 6) or 18 (15 + 3) were common 6^{th} terms. In part (b), many chose incorrect patterns to follow; $2a$, $3a$, $3a$, $4a$, $4a$, etc. and $3a$, $4a$, $5a$, $6a$, etc. and $4a$, $6a$, $8a$, $10a$, etc. were typical incorrect patterns seen. Students who got the correct pattern, perhaps with no understanding of a Fibonacci sequence, usually succeeded in both parts.

Question 29

Many students were able to score at least one mark, and often two, in this question, showing some understanding of vector arithmetic. $\begin{pmatrix}4\\5\end{pmatrix}-\begin{pmatrix}6\\4\end{pmatrix}$ was often seen but then simplified incorrectly, sometimes by adding, sometimes by multiplication and sometimes simply by incorrect subtraction. A number of students tried to square the vector **b** instead of multiplying it by 2 giving $\begin{pmatrix}4\\5\end{pmatrix}-\begin{pmatrix}9\\4\end{pmatrix}$. Quite a few students saw this as a fraction question, 4/5 −6/4, and proceeded with a common denominator etc. A number of students wrote out $\begin{pmatrix}4\\5\end{pmatrix}-2\begin{pmatrix}3\\2\end{pmatrix}$ but they were unable to complete this method.

Summary

Based on their performance on this paper, students should:

- show working for all questions including any calculations done using a calculator
- read each question carefully to ensure that their final answer matches the question asked
- ensure that they know the difference between area and perimeter
- use the correct percentage of decimal or equivalent instead of a fraction, for example, 0.3 or 30% should not be used in place of $\frac{1}{3}$
- remember to draw a straight line through points generated and then plotted in order to draw the graph of an equation of the form $y = mx + c$
- practise showing inequalities on a number line, drawing loci to identify a region, finding lengths or angles using trigonometry and writing down error intervals

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