Pearson

Examiners' Report
Principal Examiner Feedback

November 2017

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

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

Introduction

The paper was accessible to students who had been prepared for a foundation GCSE Mathematics paper. There were some questions which were not well answered especially towards the end of the paper but this can be expected from the cohort sitting the November paper.

The standard of work seen was good in places but students are reminded to show full working out. At times the handwriting of students was very difficult to read; numbers should be formed clearly and when explanations are required clear sentences should be written. If handwriting is an issue for a student centres are advised to consider special arrangements. Some marks are being lost through illegible writing.

Students are also reminded that examiners cannot make a decision about which method to mark. Whilst students may try different options it is essential they indicate which method is their final approach. This can be easily achieved by crossing out the incorrect approach. If two methods remain with no choice indicated, both methods will be marked and the **lower** mark will be awarded. It is not in the student's interest to leave more than one method visible.

It was pleasing to see that students were not over thinking questions this session and were able to work with the AO1 questions in a straightforward manner.

Report on Individual Questions

Question 1

This question was accessible to students. In part (a) some students wrote 36500 as the answer and others did not convert to just metres. With m on the answer line a final answer of 3.65 was expected.

For part (b) many students used their knowledge of 1000g = 1kg but the common misconception seen was that there are just 100 grams in a kilogram.

Question 2

Whilst this tested the order of operations, far too many students gave an answer of 90 and did not follow the rules of arithmetic.

Question 3

It was pleasing to see that most students knew that $y = 10.5 \times 4$, unfortunately a significant number could not evaluate this multiplication correctly. The need for accurate basic arithmetic on a non-calculator paper is obvious but unfortunately not displayed by students often enough.

This question was only worth 1 mark and so students with an incorrect calculation scored no marks.

Question 4

The question was very well answered with the vast majority of students scoring the mark.

$-9 + 2$ was the most common answer seen and students were happy to write in the answer boxes given.

Question 5

This was also a well answered question with many correct answers seen.

Question 6

Students were able to access this question with many identifying the correct methods to form an expression or write an equation for L in terms of a to gain at least some marks. Many understood the need to add all terms to form an expression but were unable to gain full marks due to poor algebraic manipulation skills. Some solutions showed incomplete simplification such as $L = 5a-1+4$ or gave an incorrect simplification such as a^5 in place of 5a or a^3 when beginning to write an expression.

A large number of students were able to correctly form a simplified expression but then did not convert this to an equation. Another common error was due to incorrect arithmetic when adding 4 to –1 and stating $L = 3a - 5$ as a final answer.

Question 7

Part (a) of this question was well answered with the majority of students giving the coordinates in the correct order. Most used the answer line appropriately some put both numbers before the comma given, this was allowed for the 1 mark.

In part (b)(i) the point was usually correct and labelled. A lack of labelling was condoned if this was the only point plotted on the gird. Students should be encouraged to label answers as this helps clearly communicate their intention to the marker.

Part (b)(ii) was less well answered with many students drawing incorrect lines and then saying yes. The most successful approach seen was to set up a table and give x values including 2 and show the appropriate y values. Although all these points were not needed this approach was both popular and successful. Another successful approach seen was to plot at (0,1) and show the gradient of 4 as 1 across and 4 up twice to arrive at the point (2,9).

For part (c) many candidates drew a horizontal line through (0, −2) ie $y = -2$ or no line at all or multiple lines. Some also just plotted the point (−2, 0) and gave no line at all.

Question 8

This question was accessible to all students and a good proportion of fully correct answers were seen. Many students drew the rectangle 8 by 4 without any working out being shown. Some students applied the ratio 2 : 1 incorrectly and drew a rectangle 3 by 6 as a result, this scored 1 mark.

Other students initially struggled to find factors of 32 but resiliently kept dividing by 2 to find them which was pleasing to see.

Question 9

This question was not well answered. Many students just worked out the correct answer. This did not answer the question set. The mistake must be identified to satisfy the assessment objective on this specification. Very few students identified that you should multiply 348 by 2 rather than divide.

Centres can help students by looking at questions of this style and discussing the mistakes made in the working, they can then help them to articulate the mistake rather than finding the correct numerical answer. It is also worth pointing out to students that a 1 mark question should not take too long and is unlikely to require two or three calculations.

Question 10

For part (a) many candidates did realise that Jakes scores were closer together but some struggled to explain why. A few stated the ranges, although sometimes they got them incorrect and therefore failed to gain the mark. Some students summed the scores for both Sarah and Jake and told us 'Jake because he has the highest overall total'; this clearly gained no marks as it did not answer the question. A number of students stated that 'Jake is more consistent because he has scores of 8 and above'; this statement was not sufficient to tell us that Jake's scores had a smaller range and so gained no marks.

A number of students also had the idea that the range is the mean of the differences between each number, so they found the differences between each number, added them together and divided the result.

It was pleasing to see that the majority of students were able to engage with the stem and leaf diagram in part (b) and identify that the value had been read incorrectly due the key not being used. Many gave the correct answer, communicating clearly that 26 was the correct mode and some even explained what error had been made, giving examples of how the key should have been used. Others discussed the fact that 9 was the only single digit number in the diagram. Incorrect answers were usually confused or agreed that the mode was 6.

Question 11

This question was well answered with most students able to score at least 1 mark.

In part (a) the most common error was to not realise 30÷8 gave an answer of 4 adults required rather than just 3. Most students showed some working either counting in eights or giving a division if working is seen a process mark can be awarded.

In part (b) the follow through allowed an incorrect answer in part (a) to be correctly interpreted and still gain marks. A common approach seen was to consider adding the extra children to the adult without a full allocation often showing 6 + 2 = 8 or equivalent.

Part (c) seemed to be understood but sometimes the students found it hard to articulate their answer.

Question 12

This was a well answered question. The majority of students were able to answer part (a) scoring full marks and then able to go on to answer part (b) and answer that correctly also. If a slip was seen in part (a), 2 marks were often awarded and the follow through applied to part (b).

Most candidates were comfortable with two way tables but a small minority did reverse the entries so careful reading of the headings is required.

If part (b) was incorrect often $\frac{8}{15}$ was seen as the incorrect answer, some students wrote unlikely when a numerical answer was required.

Question 13

This question was not well answered and many responses were blank. Surface area is an expected skill and knowledge that a cube has six faces is also required but most students failed to realise this and so did not divide 294 by 6. Even when drawing a diagram students often still could not see the 6 faces. Some divided by 4 or 2 or even divided by 2 and divided by 4, adding the answers together, in the possible belief that this was the same as dividing by 6.

Of those few that did divide by 6 most found the answer 49, although 48 was a popular incorrect figure, most did not realise this was the answer for the area of a square face and did not go on to find the square root.

Some other incorrect methods included 49 × 49 × 49 and 294 × 294

Question 14

Students often secured some marks for this question, but very few scored full marks. A number of approaches were seen with the most successful being those who decided to convert the fractions to equivalent fractions with a common denominator (normally 35); these candidates scored well. Some students did try to use 100 as a common denominator and this approach was usually unsuccessful.

A different approach seen was to try to draw diagrams for comparison, but these were often drawn without any consistency for the fractions and scored 0 marks.

The other common approach seen was to convert the fractions into decimals and this was very successful for those that were able to accurately show the division calculations. Some students had difficulty with 5÷7 and so the overall approach scored a variety of marks dependent on the arithmetic skills of the student.

1 mark was awarded to those students who decided to write $\frac{7}{5}$ as $1\frac{2}{5}$ but unfortunately they usually stopped at this point.

A common incorrect approach seen was to say $\frac{5}{7}$ because it was less than 1 with no consideration of the 'gap' to 1.

Question 15

A good number of students were able to gain full marks for this question and if not full marks then M1 for $\frac{9}{20}$ was often awarded. A few students tried to do 20 ÷ 9 and some others added the ratio parts incorrectly; 22 was frequently seen but this was not helpful in finding the percentage they required.

A small number of students found the percentage of the wrong colour, generally red buttons as this was the first part of the ratio; a full method for a colour other than orange was awarded M1, but students should be reminded to read questions carefully to maximise their potential to gain marks.

Question 16

In part (a) a good number of students were awarded the mark available for stating that both values had been rounded up. However a significant number only stated that one amount was rounded, with some not stating in what way. Another error commonly made was to state what the answer should have been and therefore not communicating anything about rounding or estimation. The correct answer was not asked for; the knowledge of estimation was being assessed.

For the second part of the question a good number of fully correct answers were seen, with clear processes and good accuracy in the calculations. Of those that did not score full marks many lost the accuracy mark due to calculation errors when carrying out the initial multiplication but were able to gain process marks for correctly finding either 10% or 90% for their figures.

Students who chose to use a build-up or repeated addition method rather than a grid method often lost marks due to confusion when adding their values. Arithmetic errors when subtracting £20.30 from £203 were also common.

Those students who only achieved 1 of the 4 marks available rarely showed a method for calculating 10%, with £23 rather £20.30 seen frequently.

Some students also correctly calculated 10% then failed to use it to find 90% and stated the 10% discount as their final answer.

A small minority of students did not read the question carefully, finding the cost of 30 t-shirts rather than 35, candidates are reminded of the importance of careful reading and then checking they have answered the question asked.

Question 17

This question was answered well by many candidates. The most successful approach was to write a list of possibilities and then extract the number of successful combination and place this number over the total number of combinations. Students who attempted a systematic listing of outcomes scored well. Some problems arose when an unsystematic listing was attempted or only a partial list was given.

$\frac{4}{6}$ was a common incorrect answer. Some mixed up the concept of odd and even and so $\frac{5}{9}$ was another common answer although sometimes this answer was due to a basic adding error.

Question 18

This question was well answered with many correct methods leading to the calculation of Kelan's share of £450 seen. Most involved summing the ratio parts, dividing into 450 and multiplying by 3. A few students made errors multiplying 45 by 3. Some were only able to identify Regan's share since this was $\frac{5}{10}$ of 450. The most common incorrect attempts involved dividing 450 by the 3 shares leading to the incorrect answer of 150 or obtaining one part (45) and then dividing this by 3.

Question 19

This question was well answered by students, with many gaining full marks. The most successful approach was to find the amounts for 8 people and add this on to the amounts for 16 people. On the whole non-calculator methods were shown clearly although the workings of a minority of candidates were somewhat messy and scattered making their methods difficult to decipher.

Common errors seen were 24 – 16 = 8 and then adding this value onto the ingredients to get 128g, 148g etc, multiplying the given ingredients by 2 or 24 – 16 = 8 and then multiplying by 8.

Of the candidates who attempted the question but didn't gain full marks, many managed 1 mark for an initial step or 2 marks for a correct method to find the amount of ingredients required for one of the items given in grams.

Question 20

This question was answered in a variety of ways. An approximation was required but a few number of students tried to work out the actual calculation. This is a non–calculator paper and as such students should realise that complex arithmetic would not be set. There were also some who said $4^2 = 8$, however this misconception was not seen too often.

For those who tried to approximate many rounded to 600 or used 5 thus securing 1 mark. Others went further and got to 600÷21, some then just wrote an answer of Ami or Josh without further justification, this gained 2 marks. The most successful correct answer was to get to 600÷21 and then to show 600÷20=30 or 20×30=600 thus allowing the student to justifiably select Ami or 27.1115 as the appropriate answer.

Question 21

A small number of students were able to gain 2 marks out of 3 for putting all the given numbers in standard form. Some also gained 2 marks for 0.0018 as their answer, not realising the need to give the answer in standard form as requested.

A few students gained a mark for rewriting one number in standard form or for showing 1.8×10^n.

A common mistake seen when attempting to write numbers in standard form was to write, for example, 6^{-2} rather than 6×10^{-2}

Question 22

In part (a) very few blank responses were seen. However, the responses were mixed and mainly scored either full marks or no marks at all. A variety of methods were seen to create equivalent fractions with common denominators but a large number of students were unable to find the correct numerators, leading them to the incorrect answer of $\frac{3}{20}$. Students who created fully correct equivalent fractions were sometimes then unable to add the numerators correctly but were awarded a mark for a valid method. Other common errors

included simply adding the numerators and then adding the denominators and giving $\frac{3}{9}$ as their answer.

In part(b) it was surprising to see –8 as a common incorrect answer. This question was not well answered and centres are advised to practice the use of negative indices.

Question 23

This was well answered by a majority of students. Of those students who didn't score well, errors included listing the factors of 36, arithmetic errors and not using the multiplication sign in their final answer.

A significant minority found the correct prime factors but then instead of multiplying they put addition signs between the factors or just listed the prime factors, both of these approaches lost the accuracy mark. Some did not factorise fully leaving 4 or 9 as an incorrect prime factor.

Question 24

Some students tried to use algebra to solve this problem but the majority of attempts seen were based on a trial and improvement approach, normally in a non-systematic way, trying to find 3 ages that fitted the relationship requirements in the question, and summed to 77. Those that worked systematically were more successful than those that did not. Some candidates were able to find sets of numbers eg 1, 8 and 16 that fitted the relationships, but did not sum to 77, this start was given 1 mark.

Those who used algebra often failed to use a single variable to base the relationship on. Students who identified Jay as being 14 then usually correctly found the age of the other two people. A few did not express this as a ratio as was required by the question. Provided the order of the ratios was made clear, variations on the correct order of ages was allowed for full marks, as was an equivalent ratio.

Question 25

This question often allowed students to score part marks as many could identify at least one angle in the correct place. Others were then able to go on to show that the angles in the triangle *ABF* must be 35, 75 and 70. When given, the more straightforward reasons for angles were generally clear and correct for example, opposite angles, angles in a triangle and angles on a straight line were often correctly explained. However, reasons relating to parallel lines or opposite

angles in a parallelogram were often not seen and so full marks could rarely be awarded.

A minority of students incorrectly assumed that triangles ABF or DEF were isosceles. Centres should remind students of the need to ensure they clearly label their angles either on the diagram or using 3 letter notation. Also to give full reasons for their working and only give the reasons they actually use.

Question 26

This question was not well answered. A high proportion of students did not attempt the question at all.

Many of the answers seen tried to compare only the radii whilst another common response was to say, incorrectly, that 'one circle out of 3 is shaded so $\frac{1}{3}$ is shaded' with no further explanation offered. Also comments such as 'Daisy is correct there are 3 sections to the logo and one is shaded' were very common

Few students used the area of a circle formula and of those that did, it was exceedingly rare that pi was cancelled in any comparison or working. Where marks were gained, it was for calculating the area of one circle, usually using the radius of 10.

Centres should discuss with students that if a question appears to require multiple calculations with pi on a non-calculator paper that an alternative method is likely to be available.

The thought process required for this question did appear to be beyond the majority of students entered at this level in this November session.

Question 27

For part (a) a pleasing number of students used the printed table as a basis for their calculations, clearly indicating the mid-points and showed the multiplication by the frequencies.

There were quite a few students who were able to find the mid points but weren't sure what to do next. Some went on to add the mid points together then divide by 5. A common error seen in calculations was 500 x 0 = 500 thus at least the accuracy mark was lost but if this was the only error all method marks could be attained.

Students should be encouraged to go through their exam papers with questions like this and check to see if their answer is sensible, a mean outside the data range is not.

Part (b) was poorly answered. Most students commented on the accuracy of the answer and not about the appropriateness of the mean average. Many just stated should have used the mode or should have used the median without explanation and this did not score the mark.

Question 28

This question proved challenging to many students and was not attempted by some. It was very common to see responses that confused area and perimeter, so an equation involving x and y was set equal to the perimeter which was incorrectly stated to be 48.

A small number of students used a structured approach, either involving the identification that the two expressions in x had to be equal to $48 \div 3 = 16$, or that the two expressions in x were equal. Those who did so normally identified that x was equal to 5, although there were algebraic errors seen in attempts to solve the equation. Far more students used trial and improvement methods, and some then realised that $x=5$ gave the same answer for both expressions, and then used this to show that $y=3$, the requirement of the question.

The most successful start seen was to assume $y=3$ and show $48 \div 3 = 16$ or set the expressions of the two sides equal. However many students did not develop the solution further.

Question 29

This question was accessible to many students who showed an understanding that the error lay in the joining of the points with straight lines. They expressed this in a variety of ways but often used words such as curve or smooth line or commented on the incorrect use of a ruler.

However, incorrect answers showed a lack of confidence with plotting quadratics. There were several who thought that the wrong points had been plotted, the graph should have passed through 0 or that it should have been a straight line. Other common wrong answers did not relate to the graph itself but on the lack of a title or a table of values.

Question 30

Most students attempted this question but many did not recognise the question as a reverse percentage and for those that did, they were often unable to find a complete method for the question. The most common incorrect approach was to increase £2.80 by 30%. The value of 4 was also seen from obviously incorrect working and so using the marking principles no marks could be awarded in this case.

Summary

Based on their performance in this paper, students should:

- learn metric conversions, E.g. 1 kg = 1000 g
- ensure that their basic arithmetic is sound
- memorise standard formulae for this new specification
- practice working through 'explain' and 'give reason' type questions
- read each question carefully to ensure that the final answer does answer the set question

Grade Boundaries

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