Examiners' Report
Principal Examiner Feedback

November 2018

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

Students appear to have had sufficient time to complete this paper though weaker students often did not attempt some questions. Most of the students entered for this paper seemed well suited to entry at the foundation tier.
The paper gave the opportunity for students of all abilities to demonstrate positive achievement. While nearly all questions were accessible to a good number of students, there were few students able to work confidently on all the content matter tested. In particular, questions 15 (applying ratio in a real context), 16 (similar shapes), 23 (inverse proportionality), 26 (areas involving circles) and 28 (angles of a polygon) proved a challenge to most students.
Many students set out their working in a clear and logical manner. It is encouraging to report that students who did not give fully correct answers often obtained marks for showing a correct process or method. However, there was a significant number of students who did not always present their working in an ordered way. This was particularly true for questions 14 and 22.

Report on Individual Questions

Question 1

This question was quite well done. The most common error was for students to write 0.152 at the end of their list presumably because these students mistakenly thought that the number was bigger than the others because it was the only number with 3 decimal places.

Question 2

Nearly all students correctly wrote that 0.6 is 60%. The most common error seen was to write 6%.

Question 3

The vast majority of students answered this question correctly. Some students confused factors with multiples and mistakenly wrote that 20 is a factor of 10.

Question 4

Nearly all students correctly rounded 7829 to 8000.

Question 5

All parts of this question were answered well. Parts (a) and (b) were answered correctly by almost all students. A small proportion of students incorrectly placed brackets round the 7 and 2 in part (c).

Question 6

This question was generally answered well. Many different approaches were possible but most students either showed that only 7 tins of cat food were needed to feed the 2 cats for 14 days or that the cat food available would feed the cats for 16 days. Students working was generally clear but when diagrams were used they were not always well annotated or accompanied by clear explanations. A small proportion of students produced correct working but wrote down an incorrect conclusion, that not enough food had been bought.

Question 7

A large proportion of students successfully completed the pictogram. Those students who did not obtain full marks had often made errors in their arithmetic or did not get all three of the frequencies for apple trees, cherry trees and pear trees correct. The final representation for the number of plum trees appeared in several different acceptable forms.

Question 8

This question was generally well answered. The majority of students were able to write down the coordinates of point A and to mark point B on the grid. The most common incorrect response in part (a) was $(-1, -2)$ and in part (b) some students plotted the point with coordinates $(3, 2)$. Part (c) was less well done. Many students either drew the line $y = -4$ or another line which passed through $(0, -4)$. A number of students plotted a point at $(-4, 0)$ rather than the line required.

Question 9

This question acted as a good discriminator. It was encouraging to see clear substitutions shown in the working space and this usually led to students scoring at least one mark for their response. The majority of students went on to obtain the correct value. However, some weak students added 29 and 34 or gave answers which were expressions in g and h.

Question 10

There were many fully correct answers to this question but also many students who scored one mark for giving two numbers which have a sum of 32, only one of which was prime. 9, 15, 21 and 27 were commonly mistaken as prime numbers. Some students included 1 as one of their two numbers. The great majority of students gave numbers with a sum of 32 but a small proportion of students gave two numbers with a product of 32, for example 2 and 16.

Question 11

Well over four in every five students could identify the fraction not equivalent to $\frac{3}{4}$ in part (a). Part (b) provided more of a challenge. A majority of students obtained a correct answer, namely $\frac{11}{12}$, or a fraction equivalent to this. $\frac{66}{72}$ was the most often seen equivalent fraction. A large number of weaker students merely added the numerators and added the denominators, giving $\frac{6}{18}$ as their answer.

Question 12

There were many fully successful answers to this question though a good proportion of students could not relate the idea of a "fixed charge" to the graph and there were some students who gave £40 as their answer to part (b) this being the delivery cost corresponding to a distance of 20 miles instead of the difference between two delivery costs. Some students interpreted the vertical scale on the graph incorrectly and used 2 mm to represent £1.

Question 13

This question, testing multiplicative relationships and ratio notation proved to be a good discriminator. Many students gave the correct ratio 4 : 1 : 2 or an equivalent ratio as their answer. Examiners did not expect the ratio to be written in its simplest form. Of those students who did not score full marks, many either gave a partially correct ratio for which examiners awarded one mark or they expressed the scores algebraically, for example $4x$, x, and $2x$. Some students re-ordered the ratio into alphabetical (or size) order on the answer line. This was acceptable provided the "parts" were clearly linked correctly to Azmol, Kim and Ryan..

Question 14

Most students scored at least one mark for their responses to this question and often two marks for finding the size of angle *BCD* and the size of angle

ADC. These were often seen marked on the diagram. The third mark for a method to find the size of angle *ABC* was more elusive. A significant minority of students assumed the shape was a kite and so stated that angles *ABC* and *ADC* were of equal size. This was not acceptable to examiners who expected students to use the angle sum of a quadrilateral to find angle *ABC*. Students who did gain all three method marks for finding the angles were often able to give geometric reasons accurately and so score the final communication mark. However, centres and students are reminded that they need to express reasons in full, for example, "straight line is 180°" is not acceptable but "**angles** on a straight line sum to 180°" is acceptable. Some students used spurious reasons such as "alternate angles" or "corresponding angles".

Question 15

Very few students successfully completed this question. However, in part (a), a large proportion of students were able to make a start to the process by dividing 300 by 5 or by dividing 200 by 2. These students were awarded one mark. They often went on to add 60 and 100 to give the incorrect answer, 160 ml. Weaker students frequently gave an answer of 1900 (from $2 \times 200 + 5 \times 300$). Part (b) was also poorly answered with some students suggesting that less fizzy drink could be made because there was 40 ml less lemonade. Some other students answered "yes" to part (b) because they did not appreciate that the amount of orange juice was the limiting factor.

Question 16

A disappointingly large number of students reasoned that the two rectangles were similar because each side of the smaller rectangle had 4 cm added to give the sides of the larger rectangle. Other students said that Jim was correct because "the rectangle has been enlarged by 4". Only a very few students were able to state something along the lines that in order for the two rectangles to be similar a common multiplier is needed between corresponding sides. It was disappointing to read that a significant proportion of students thought that for shapes to be similar their area and/or perimeter must be the same.

Question 17

Part (a) of this question was answered well by many students who produced a complete and accurate frequency tree. Nearly all students gained at least one mark in this part of the question. More usually they scored at least 2 marks. The correct answer to part (b), $\frac{37}{61}$, was given by a reasonable proportion of students and many other students could use the frequencies from their diagram in the right way to find a probability which was correct for their diagram. In cases where students earned only 1 mark in part (b), it was often due to an incorrect denominator of either 48 (the number of women) or 80 (the total number of people). This question was a very good discriminator with every mark from 1 to 5 being awarded to a good number of students. Very few students scored no marks for their responses, some of whom gave an improper fraction as their answer to part (b).

Question 18

Students often scored well on this question, with the majority of students scoring at least 2 marks for finding the reduced price of a box of cereal bought at “Food Mart” together with the total number of grams in a box of cereal bought at “Jan’s Store”. It is encouraging to report that more students are now showing a full method when finding percentages, not merely using a build up method stating “10% =…” etc. In order to compare value for money at the two shops, most students opted to find the number of grams bought per pound. Arithmetic errors were quite often seen when students tried to divide 520 by 5. Despite the instruction in the question that “you must show all your working”, many students wrote their conclusion without citing comparative values and so could not be awarded full marks. A few students scored 3 marks out of 4 because they chose the wrong conclusion after obtaining correct comparable values.

Question 19

This question proved to be a good discriminator between more able students sitting this paper and each of the 0, 1 or 2 marks available was scored by a substantial number of students. The majority of students scored one mark for a rotation of 180 degrees, demonstrated by the correct orientation of the shape, while being unable to place their image in the correct place on the grid. Of those students not able to score any marks, many had rotated the shape by 90 degrees. Students are reminded that tracing paper may be used in the examination to help them with this type of question.

Question 20

Students were asked to “work out the value of a numerical expression in this question. Unfortunately, a substantial number of students who used laws of indices to simplify the expression left their answer in the form “3^2” and denied themselves full marks. Students using the laws of indices were generally more successful than students who attempted to work out the values of 3^7, 3^{-2} and 3^3 as their starting point. This was probably not surprising in a non-calculator paper. A large number of students evaluated 3^{-2} as -9. Many students “simplified” $3^7 \times 3^{-2}$ to 9^5 then followed this by “simplifying” $9^5 \div 3^3$ to 3^2. These students, of course, could not be given any credit.

Question 21

Only the most able students sitting this paper were able to score both marks in part (a) of this question. However, most students scored at least one mark for a correct substitution of the values into the formula. Students who started to work out the value of v^2 by breaking the formula up into parts were less likely to score this mark than those who started by substituting values into the equation before attempting to break it up and make any evaluation. Common errors which prevented students from getting full marks included stating $12^2 = 24$, working out $2 - 3 \times 18$ for $2as$ or multiplying both -3 and 18 by 2. Part (b) of the question was also well done by some students but many students were unable to make a correct first step and so could not be given any credit for their attempt. The most common errors seen included the subtraction of $2a$ rather than division by it and having $u^2 - v^2$ instead of $v^2 - u^2$ as part of their rearranged equation.

Question 22

There were many good attempts at this multi-step question with a majority of students scoring at least 3 of the 5 marks available. Most students got as far as working out the share that each of the 7 salesmen would get if 60% of the bonus was shared out between them. These students often then incorrectly calculated 25% of 210 rather than 25% of 180 so no further marks could be awarded. Some student's answers were affected by arithmetic errors in the subtraction of 840 from 2100 or when dividing 1260 by 7. Only a very small proportion of students approached the problem by considering the total amount shared by the salesmen under each scheme. Examiners noticed that the working in this question was often poorly organized and scattered around the page.

Question 23

One of the least well attempted questions on the paper, the most common answer seen was 72 minutes. This was obtained by students mistakenly making the assumption that the time taken to fill the pool would be directly proportional to the number of taps used. It seems disappointing that more students did not appear to question the fact that it might take only 24 minutes for 1 tap to fill the pool or that they had found that fewer taps would take less time to fill the pool. Some students who made this error then went on to state, in part (b), that they had assumed that the pool would take longer to fill with fewer taps. Examiners expected a statement in part (b) equivalent to saying that water flowed out of each tap at the same rate, an assumption which could lead to a solution of the problem. Many students resorted to a commentary on their method, for example "I divided by 5 then multiplied by 3" or as mentioned previously the vague statement that less taps would mean it takes longer to fill the pool.

Question 24

There were some good answers to this question from students who obtained full marks in part (a) but it was rare to see a correct response to part (b). Where students did not score all three marks in part (a) they often gained one mark for converting one hour to seconds or for using the relationship between time, distance and speed correctly. However, a significant number of students used an incorrect relationship between speed, distance and time, commonly attempting to calculate 213 ÷ 60 or 213 ÷ 1. In some cases, this incorrect application was accompanied by a correct distance, speed, time "triangle". Responses to part (b) were usually restricted to stating that the estimate was an underestimate because the speed had been rounded down and it seems that most students could not see the link between dividing by a smaller number and getting a bigger answer

Question 25

This standard question on solving simultaneous equations was attempted by a large proportion of students. Unfortunately, it was only rarely completed without error. Students sometimes tried to add or subtract the original equations, without multiplying first. Those students who did make better progress were often confused about which operation to use once the coefficients of x or y were equal and there were many errors when dealing with signs. There were very few completely correct solutions. A very small number of students successfully used a method involving substitution. Trial and improvement methods were also seen but were largely unsuccessful.

Question 26

This question was not done well. A small proportion of students quoted a correct formula for the area of a circle. Unfortunately, they were usually unable to use the formula to find the area of a semi-circle of radius 10 cm or the area of a quarter of a circle with radius 20 cm. Many students quoted an incorrect formula, often citing the formula for the circumference of a circle instead. Many students found the area of a square of side 20 cm but this was by itself not enough to score any marks. Very few students scored 2 marks or more for their answers.

Question 27

Most students were able to score some marks for their responses to this question. The tree diagram was often successfully completed and where it was not, students were often able to place a correct probability for Amina taking a green ball from the first bag together with a correct probability for obtaining a green ball from the second bag following a red ball being taken from the first bag. The incorrect probabilities $\frac{8}{19}$ and $\frac{11}{19}$ were often seen placed for the probabilities of taking a red or green ball respectively from the second bag following a green ball having been taken from the first bag. Part (b) of the question was answered correctly by only a small percentage of students. By far the most common answer given in part (b) was $\frac{8}{19}$ obtained from the spurious method of adding $\frac{3}{10}$ and $\frac{5}{9}$.

Question 28

This, the last question on the paper targeted the most able students sitting the examination. It was very rare to see a fully correct solution or indeed any responses which could be credited with part marks.

Summary

Based on their performance on this paper, students should:

- learn and practice standard techniques involved in solving simultaneous equations paying particular attention to accuracy where negative signs are involved.

- use tracing paper to help in questions involving the transformation of rotation of a shape about a point.

- carry out a common sense check on the answers to calculations, so for example expecting the time taken to fill a pool to be more if less taps are used.

- check all calculations for arithmetic errors particularly when completing papers where the use of a calculator is not allowed.

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