Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

November 2019

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

This paper gave the opportunity for students of all abilities to demonstrate positive achievement. While most 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, Q24 (angles and ratio problem), Q27 (scale drawing) and Q28 (angles problem) proved a challenge to most students.

Students appear to have had sufficient time to complete the paper and those entered for this paper seemed generally well suited to entry at the foundation tier.

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.

Report on Individual Questions

Question 1

This question was quite well done with a big majority of students giving the correct answer "70". Examiners accepted the answer "7 tens" but did not accept the word "tens" alone. Some students gave other incorrect responses such as "tenths" or "7 tenths".

Question 2

This question was also answered well. Incorrect responses seen included 5, 4.5, 4.60 and 45.8.

Question 3

The majority of students answered this question correctly. 0.317, 317 and 31700 were the most commonly seen incorrect responses but some students introduced zeros between one or more of the digits in 31.7 and gave answers such as 3100.7.

Question 4

This question was not done very well. Answers given were often not equivalent to $\frac{28}{70}$.
A significant number of students who did some correct working did not give the fraction in its simplest form, most commonly leaving it as $\frac{14}{35}$.

Question 5

Nearly all students answered this question correctly though a few students gave incorrect answers such as 1.5 and $\frac{15}{100}$.

Question 6

This question was generally answered well. Nearly all students could use the representation to write down the number of pictures sold in January in part (a) of the question.

In part (b) a similarly high proportion of students could represent the number of pictures sold in April on the diagram.

Most students could also score the two marks available in part (c) though a significant proportion of responses contained mistakes in arithmetic, usually in one of the totals for a particular day. These responses normally got one mark for adding the four totals 24, 28, 20 and 12, three of which were correct.

Question 7

Most students scored both marks for their answer to this question though a surprisingly low proportion of students took the shorter route of writing 1¼ hours as 1 hour 15 minutes then comparing it with 1 hour 25 minutes. Students generally preferred to convert both times to minutes.
This approach was often successful but there was a significant number of students who wrote 1¼ hours as 1.25 hours then changed this to 85 minutes. Their resultant final answer was "0" and the sense that this must be wrong was usually missing. Another error seen was writing ¼ of an hour as 45 minutes. This led to a final incorrect answer of 20 minutes.

Question 8

Over a half of all students scored the full three marks for their responses to this question. The majority of students worked in grams, starting by converting 3 kilograms to 3000 grams. Only a small number of students worked in kilograms. Most of the errors seen in working were in the calculation of 4×650. Students making a mistake here usually scored two of the three marks available. The most common error seen in the method to solve this problem involved students dividing the 650 grams by 4 as part of their solution. Some other students subtracted the weight of one block from the total weight of all five blocks to give an answer of 2350 grams.

Question 9

Most students scored full marks for this question. The most common errors seen were either in the subtraction of 135 from 180 or in only subtracting 35 from 180. Students making an error with the subtraction could usually be awarded one mark. Perhaps it was surprising that students making errors rarely used a common-sense check to rule out the possibility of x being over 100°.

Question 10

There were many fully correct answers to this question but also many students who scored one mark for plotting the point correctly in part (a) of the question but in part (b) wrote down $(0, -1)$ instead of the correct $(-1, 0)$ for the coordinates of the midpoint of BC.

Question 11

This question was a good discriminator. More able students scored two marks for a complete list without any repeats. About a third of students scored one mark for listing at least 4 correct outcomes but were not able to provide a fully correct answer. A total of 6 combinations was commonly seen. Some students listed the possibilities of how many heads and how many tails could occur without making it clear the order of the heads and tails within these possibilities, so for example, stating 1 heads and 2 tails without differentiating between HTT, THT and TTH. Of the students who could not be awarded any marks, a good proportion of them gave outcomes for only 2 throws.

Question 12

Part (a) of this question was well answered and many students showed clear working together with a clear conclusion based on supportive figures. Most students stated that Rehan did not have enough money and gave their reason as either "he would need $215" or that "he only has $65 left".

Part (b) was less well answered but differentiated well between the most able students sitting the paper. Many students failed to "use a suitable approximation" so could not be awarded any marks for their response to this part of the question. Only a relatively small proportion of the students who did use an approximation guaranteed the statement that "Rehan is wrong" by using a value below £0.749, for example 0.74 or 0.7.

Question 13

Part (a) of this question was answered very well and it was unusual to see students not receiving any credit for their response to part (b). The most common incorrect response to part (a) was p^7.

In responses to part (b) there was a significant proportion of students who collected the terms in x correctly and who collected the terms in y correctly only to give a final answer of $8x - y$. These students were awarded one mark. $8xy$ was also seen as a final answer quite frequently. Where this answer was preceded by "$8x$" or "y" as a standalone term in the working space, examiners could award one mark.

Question 14

Students usually scored two marks for a fully correct response to this question. There were several different methods seen and no one method was used much more frequently than any of the other methods. Students who could demonstrate a correct method scored at least one mark. Errors in the evaluation of 10 × 20 were commonplace. Of those students who could not be awarded any marks, a common approach was to calculate 20 × 10 + 3 × 5.

Question 15

Most students completed the frequency tree accurately and scored three marks for their response to part (a). The errors seen were usually caused by arithmetic mistakes. Students should be encouraged to write down their calculations in the working space as those students who did this were usually awarded the first and second marks even where their entries in the diagram were incorrect.

In part (b) $\frac{29}{45}$ was the most common incorrect answer seen. Students who wrote this had clearly not considered carefully the statement in the question that "one of the 120 people is chosen at random".

Question 16

About three quarters of students gave a correct answer to part (a) of this question.

A fully correct answer to part (b) was seen much more infrequently. However, a fair proportion of students could score at least one mark for either an attempt to find the gradient of the line representing Steve's journey home or for using the speed, distance, time formula correctly. Students often scored a mark for $\frac{25}{30}$ but could then not convert this to a speed in km/h. Those students who did give the correct answer, 50, had usually argued that 25 km in half an hour was equivalent to an average speed of 50 km/h. Other common errors included multiplying 25 by 30 and dividing 25 by 2 instead of by $\frac{1}{2}$.

Question 17

A high percentage of students correctly obtained the value of x from the equation given but only about a quarter of students were able to use the correct order of operations to find the correct value (18) of the expression $2x^2$ when $x = 3$. Instead most students worked out the value of $(2x)^2$, giving 36 as their final answer. The working 2 × 3 = 6, 6 ×6 = 36 was seen on many scripts.

Question 18

Marks gained for responses to this question were usually restricted to one or two marks for either finding the value of x in the pie chart for school A and/or for finding the number of students at school B who had tigers as their favourite animal. It was relatively rare to see a student complete the question successfully. Many students seem to get confused between the angles which represented the proportions of students and the numbers of students themselves.

Question 19

This question was not well done with only a small proportion of students gaining any marks and few students gaining two marks. The great majority of responses were in a form connecting the two numbers –3 and 1 with an inequality sign (often incorrect), for example $-3 \leq 1$. Such responses could not be given any marks. A number of students listed integer values only.

Question 20

Many students made a good start to this question by either starting with a prime factor decomposition of at least one of the numbers 108 and 120 or by writing down multiples of each of the numbers. Some allowance was made for arithmetic errors and students who used one of these two approaches generally scored at least one mark. Students who listed multiples were more likely to obtain full marks than those who used prime factor decomposition. It did seem that students who used the latter approach lacked confidence in how to use their products of prime factors to find the lowest common multiple. Final incorrect answers of 2 (lowest common factor) and 12 (highest common factor) were often seen.

Question 21

This question was quite well attempted by most students sitting this paper, with a high proportion of students being awarded at least two of the four marks available for finding that there were 10 men and 20 children in the choir. Some students stopped at this point, giving 20 as their final answer. However, many students did go on to write down a correct ratio and simplified it to .2 : 1. Examiners allowed 2 : 1 for full marks though the question did in fact ask for only the value of *n*.

Question 22

This question discriminated well at the top end of the ability range with many students getting each of the possible marks for their response. Some students realized the need to change the mixed numbers to improper fractions and demonstrated they could do this for at least one mixed number but could get no further. They scored 1 mark. Students who successfully multiplied the two mixed numbers but left their answers as improper fractions, for example $\frac{28}{12}$, scored 2 marks. Correct answers in the form of a mixed number scored full marks. They did not need to be fully simplified so, for example, $2\frac{4}{12}$ scored full marks. Many students benefitted from this. Disappointingly, there were a large number of students who tried to reach the answer by multiplying the whole numbers and the proper fractions separately to get an answer of $1\frac{1}{4}$ or equivalent. Some confusion between multiplying and dividing fractions was evident in a significant number of student's responses where inverting the second fraction before multiplying or cross-multiplying was seen quite often.

Question 23

There were few accurately constructed lines seen in answer to this question. More commonly, where students did gain some credit for their response, it was one mark for drawing a perpendicular line from the point *P* to the line *CD* within the tolerance allowed but without any evidence of it being constructed with a ruler and compasses. Some students gave an accurate construction of the perpendicular bisector of the line *CD*. They could not be awarded any marks.

Question 24

This multi-step question was not answered well. Many students mistakenly used the result that "angles on a straight line sum to 180°" with angles *ABC*, *BDC* and *BAC* to get an answer of 54° for the size of angle *BDC*. Of those students who did make a correct first step to find that angle *BCA* was 54°, few went on to split the angle correctly in the ratio 2 : 1 and then to complete the problem successfully.

Question 25

Relatively few students took into account that there was more than one red brick and more than one blue brick. Many students' responses consisted of the calculation (5 + 9 + 6) ÷ 10 or (5 + 9 + 6) ÷ 3. These could not be given any marks. Some students started to find the total weight of the red bricks or of the blue bricks and scored 1 mark for doing this.

Only about ten per cent of students gained two or more marks for getting as far as calculating a value which could be used to evaluate the statement that "The mean weight of the 10 bricks is less than 7 kg." A few students calculated the total weight of the bricks but did not calculate the mean. If they compared this with a stated value of 70 they could gain full marks.

Question 26

About a half of students taking this paper answered part (a) correctly to score 1 mark. Examiners saw the incorrect response "p^7" on many occasions.

About the same proportion of students scored at least one mark for their response to part (b) for giving a final answer which included at least two out of three correct components of the expression $2x^4y^2$.

Question 27

Fully correct answers to this question were hardly ever seen. Only about one third of students were able to get at least one mark for drawing a correct bearing and/or for calculating the distance travelled by the boat and using the scale of the diagram. Examiners were able to award three marks to students who plotted the position of Q accurately on the diagram. Those who did plot Q correctly were often able to use the scale to give an accurate distance from L to Q but were unable to measure the bearing, often giving the angle measured anticlockwise from the north line. Weaker students often started their working by multiplying 90 by 12 but seemingly with little purpose evident. There was a disappointing number of students who measured the length of one or more of the north lines on the diagram.

Question 28

This, the penultimate question on the paper, targeted the most able students sitting the examination. It was rare to see a fully correct solution and most responses could not be credited with any marks. A very common error made by students was to think that an obtuse angle was one greater than 180° or to mistakenly use one of the results that "angles in a triangle sum to 180°" or "angles on a straight line add to 180°". Students using 180° but carrying out subsequent processes accurately to get an answer of 34 were rewarded with some credit.

There were very few students who used algebra to formulate and solve an equation or inequality. Instead, most students who attempted the question used a numerical approach, sometimes by trial and improvement. Students who used such an approach and achieved an answer in the range $15 \leq x < 16$ could be given some credit.

Question 29

Answers to part (a) of this question revealed several approaches. A number of students showed a good understanding of similarity and gave a correct answer which scored full marks, but many students used differences leading to the incorrect working $15 - 10 = 5$, $9 - 5 = 4$. They could not be awarded any credit. Some students made little headway with the question. A minority of students obtained one mark for finding a relevant scale factor but were then unable to complete the question successfully.

A greater proportion of students gained some credit for their responses to part (b) than in part (a). There were a good number of fully correct answers. Where two marks were not scored, students often made some progress, for example by marking the lengths 4cm and 10 cm for HG and HK respectively and then working out that the length of GK was 6cm, but getting no further. It was not uncommon to see EG marked on the diagram as 10 cm and/or FG marked in as 6 cm, leading to an incorrect answer of 4 cm for the length of EF.

Summary

Based on their performance on this paper, students should:

- consider carefully the facts concerning angles, for example when “angles on a line add to 180” applies and when it does not

- practice solving problems using the mean, paying particular attention to how many pieces of data are to be added before dividing to find the mean

- carry out a common sense check on the answers to calculations, so for example you should expect the angle x in question 9 to be less than 90°

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

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