Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

Summer 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

The paper was accessible to students who had been prepared for a foundation GCSE Mathematics paper. However, there were some questions that were not well answered especially those which required an explanation. As this is the non-calculator paper, some students lost marks through basic arithmetic errors, for example 0×4 being given as 4 instead of 0 was seen many times. Multiplication by addition and then miscounting the terms was also a common error.

For the longer questions it was pleasing to see that the majority of students showed a reasonable amount of working. Students should be reminded that working is essential to ensure part marks can be awarded for incorrect answers but they should not overload the page with many different options as choice will be applied and the lowest scoring method seen is marked unless the answer on the answer line indicates the method used.

Report on Individual Questions

Question 1

A good opening question that was accessible to almost all students.

Question 2

This question was also well answered with very few errors seen.

Question 3

This question was well answered. The vast majority of students just wrote down the answer but some did not evaluate the bracket first and so gave an incorrect answer.

Question 4

This was well answered with the majority of students being awarded the mark. However, some incorrect answers were seen and 25 was a common incorrect answer.

Question 5

This question was well answered but some students did find it more challenging than the previous questions. Many showed working, listing the numbers and looking for the ‘middle’. Of those that gave an incorrect answer, 11.5 was a common error.

Question 6

This question was the first on the paper to be classified as a problem. Most students scored well on this question. Successful students set their work out in a methodical way, making sure that the answer to each component was clear so that they knew which numbers to add at the end. Many students added the prices for one person then multiplied by 4, this seemed to be quite a popular way to tackle the problem. However, some students found the use of 7 nights and 4 people challenging. They appeared unsure when to use which number as a multiplier and so just multiplied all the numbers together. Others forgot to multiply the 50 by both 7 and 5 meaning that £1950 was a popular incorrect answer which gained three out of the available four marks.

Unfortunately, there were lots of arithmetic errors seen in the multiplication, meaning the loss of the accuracy mark even when a full correct set of processes were seen. The numbers in this question were easy for manipulation so errors should not really have been so common.

Question 7

Part (a) was well answered with many students gaining two marks. Common errors for those who only gained one mark included arithmetic errors or misreading the height of the yellow flowers.

Part (b) was not as well answered as part (a) but many correct responses were seen. The most common incorrect response was 10 instead of white.

Question 8

This question was generally answered well and most students scored at least one mark. This was available either by converting to percentages, comparable fractions or equivalent decimals, or for a list with one misplaced fraction – usually 7/12. Lists were often given unaccompanied by working, so more than one misplacement resulted in no mark being awarded. There was little evidence of the list given in descending rather than ascending order, though many weaker students simply ordered on the size of the denominator. Attempts by drawing diagrams are to be discouraged, as these are rarely of a consistent size, or accurate enough depictions of the fractions. Accurately stating ½ = 0.5 or 50% and ¼ = 0.25 or 25% was sufficient for the method mark to be awarded, so it was in the student's interest to show their working and stating these simple conversions is a better strategy than poorly drawn diagrams.

Question 9

In part (a) most students managed to use a time difference and multiply it by 4. Those students who used a method starting with 4miles in 1 hour and 2 miles for the 30 minutes were generally successful although 4.5 instead of 6 was seen on some occasions.
In addition, doing 1.5 × 4 = 6 was usually successful however far too many students tried to work in minutes and used 90 × 4 = 36; they then seemed to realise that this answer was too big and divided by 100 to get 3.6.

Many students had trouble manipulating the speed-distance-time formula choosing to divide rather than multiply, with 90 ÷ 4= 22.5 being seen often.
The use of time in calculations still remains an area that students find difficult and centres are advised to revise this topic well with students.
For part (b) most students gained one mark as they could work with time well enough to reach the time when Ruth left the library. Some students could not convert 1 and 1/4 hours correctly

often using 1 hour 25 minutes, hence giving an answer of 12:45. Some students gave the final answer as 12:35am losing the accuracy mark.

Question 10

In general, all three parts of this question were well answered. The answers to part (a) and part (b) were often just written down. Working was often seen in part (c), either the traditional algebraic method or a trial and improvement method. No marks are awarded for a trial and improvement approach to solving an equation unless the answer is correct so it is not the best approach to use.

Many students gave the correct answer but for those that did not and who used an algebraic approach many often wrote -2 beneath each side but then failed to do this correctly so did not score as they did not complete a correct first step. Some subtracted 2 from 6w and 2 and 20, others subtracted only from the 2.

Question 11

This was well answered and all three of the approaches given on the mark scheme were commonly seen. The main issue was the accuracy mark which was most often lost because of a single simple arithmetic error. A small number of students struggled with this question and clearly didn't understand how to multiply the two numbers together; some just multiplied 70×50 and added this to 4×8. This was the most consistent conceptual error seen.

Question 12

Part (a) was generally answered well with the majority of students recognising that angle *ABC* is 90 degrees, and the others must be subtracted from it. When this method was adopted it usually scored 2 marks, with the odd exception where a calculation error occurred. Very few students created an equation to help solve this question, preferring normally to state 40 without any calculation

Those not scoring any marks generally used 180 degrees or, less frequently, 360 degrees and attempted to subtract the other angles from this. Some added 25 to 25 to get 50, and gave 50 as the answer. Encouragingly, very few students attempted to measure the angle with a protractor. For part (b)(i) most students scored 1 mark or better. Recognition of the correct angle (b or d) was good. A small proportion of students attempted to label the angles using 'PQ' rather than 'b' or 'd', so scored 0 marks. 'Parallel lines' as a reason was a common misconception, along with naming an incorrect relationship such as alternate angles, and simply writing 'opposite' rather than 'vertically opposite' or 'opposite angles'

On the whole (b)(ii) was answered well. Marks were lost when students calculated the remaining angles, but then failed show a link to 360 degrees, for example some students just stated the size of each of the angles a, b, c – but gave no reasons for their sizes. Others lost the mark when arithmetic errors led to incorrect values being given.

It is worth centres noting that this is a communication mark and so the answer must not be contradicted as this will result in the mark being withheld. Students should be encouraged to give concise reasons.

Question 13

This question was very poorly answered. Only a relatively small proportion of students were able to express multiply x by 10 in an acceptable format. Some mixed up multiply with divide, e.g. $x/10$ was seen, others knew the connection was a factor of 10 but were unable to write an expression, e.g x cm = 10 mm was given and another incorrect response was $x = 10x$. There were many instances of units being included within the expression they offered and this often made the expression invalid. Sometimes m was also given in the expression. It is fair to say that the majority of foundation students found this question challenging.

Question 14

Part (a) was well answered by most students. There were some errors seen but there was no common pattern.

However, part (b) was not well answered by students. Some students could not see the fault within Fiona's working and thought the answer was correct. The two most frequent incorrect responses were that there are not two halves in one, and that there are only two halves in any number ie. in 48 there are two halves, and both are 24. Thus, finding half of 48 not the number of halves in 48. Those who did answer correctly often worked out that there were 96 halves. The most successful students explained that dividing by half is the same as multiplying by two and therefore there are 96 halves in 48

Question 15

Both parts of this question were well answered. In part (b) 15 was seen as an incorrect answer and occasionally an arithmetic error was seen.

Question 16

Overall, students performed well with the expansion in part (a). However, a small number of students tried to simplify their correct answer of $10m – 15$, commonly giving $15m$ and therefore losing the mark. Another common mistake was to only multiply the first term by 5, giving $10m – 3$ or $5×2m – 3$ but full processing was required. Equally, some students thought the expression was an equation which they tried to solve.

Part(b) was generally answered quite well with many students gaining the mark. In general, most students either got the correct answer or did not attempt the question. Common mistakes included $3(n + 12)$, $3n + 4$ and $n + 4$.

Question 17

This is another question where an explanation was required and students continue to find this difficult.
Very few students got both parts correct. For part (i) many did not appreciate the fact that more trials meant a better estimate, instead believing that more tails gave a better estimate. Some responses wanted the probabilities to be as close to a whole number as possible, and incorrectly chose Stuart for that reason. Other common errors were saying that Maxine's were better because they gave a closer answer to 50% or 0.5 or even and thus that she was not using a biased coin. A significant number said that Stuart's was better because he had thrown fewer.

For part (ii) the most common incorrect answers were 65% by simply calculating 70% (=7/10) and 60% (30/50) and then finding midpoint or just stating 0.5. Some of the students calculated separate probabilities without combining them. An answer of 37 was also common, showing the failure to write a probability in a correct format, a few ratios were seen.

Question 18

Many fully correct justifications were seen. There were some well organised attempts clearly earning three method marks where an arithmetic error was obviously the only mistake. The most commonly used starting points were either to find the area of the rectangle or the number of paving stones needed to cover a side of the rectangle. The second step then caused difficulty, the area of the rectangle was often divided by the length of a stone, rather than the area of one stone, or the number of stones on each side was added rather than multiplied.

Students using the second approach were more successful if they worked out the cost of covering one length eg 20× (£)2.50, then said they needed 4 rows like this to find £200. This kind of approach using the diagram and drawing in the rows seemed to add scaffolding for many students.

Some students tried to work with perimeter which is not a correct first step and so no marks could be awarded.

Question 19

Many students did part (a) well although some common mistakes were to change the denominator to 15 but forgot to multiply the numerator, some added the fractions instead of subtracting and some subtracted the numerators and denominators and got ½.

For part (b), students who attempted this question answered it well and were able to simplify fully. However, the most common mistake seen was for students to find a correct answer and not simplify fully i.e. leaving the answer as 3/6 or simplifying incorrectly 6/12 = 3/6 = 1/3 was seen often.

It is worth noting that some students wrote and tried to use KFC (Keep, Flip, Change). As this was multiplication rather than division no marks were gained by those students and this showed a lack of understanding of the concept of calculating with fractions.

Question 20

There were very few correct answers of 12.5% seen. Many students did not attempt this question at all. Success came most commonly from a diagrammatic approach. Successful students drew examples of square A inside square B and recognised that the area of A was in fact a quarter of the area of B and therefore the area of the triangle was 1/8 of the area of B. This helped students to visually see the relationship between the 2 shapes. A few students were unable to convert 1/8 into a percentage. Even here arithmetic errors were made with 25 ÷ 2 = 13 seen.

Some students assigned lengths to the squares in order to find areas but only a small number of those went on to actually calculate an area.
The most common incorrect answer seen was 25% from halving 50%.

Question 21

Many students were able to gain some marks on this question. With many able to gain at least one mark either for finding a total of 18 boys or the number of girls who got the bus. However, those who wrote down a mass of figures with no indication what these represented rarely scored any marks unless the final answer was correct; it is imperative the students do show clearly their route through a problem like this.

The most successful approach was to use a two-way table or a frequency tree, but others were also able to gain full marks. It was common for students not to have a logical approach and to see numbers spread across the page without any indication of what the numbers represented. Students should realise that writing words or descriptions would help their own reasoning and also enable them to be awarded method marks, as the method is clearly indicated.

Although there were different paths through the problem, a popular method was to find the number of boys that walked and add it to the number of girls that walked. Those who used a two-way table or a frequency diagram got this correct more often than those that just tried working logically through the problem.

A common mistake with a frequency diagram was to miss off the girls that cycle or boys that walk and only place the figures already given in the diagram whereas with a two-way table it was more obvious which 'gaps' had to be filled. If a diagrammatic approach is to be used it is worth reminding students to draw the diagrams big enough to fill in, some frequency trees were very difficult to read.

A different approach was to try to find the total that didn't walk and subtract from the overall total, this was not so accurately done as the girls that cycled were often missed.
A common misconception seen was to just add all the numbers given and subtract from the total.

Question 22

Part (a) was well answered. The majority of students had three probabilities summing to 1 in the table, earning at least one out of the two marks available. The most common incorrect answer was to give any two numbers that add to 0.8 or 0.8 twice.

Part (b) was less successful than part (a). Many students initially made the connection that 0.2 was equivalent to 12 cubes, therefore the 0.4 was equivalent to 24 cubes but did not always add correctly. Quite a few students related the number of cubes to the probability incorrectly, by assuming that if a probability of 0.2 is equivalent to 12 cubes, a probability of 0.4 must be equivalent to 14 cubes, giving the most common incorrect solution of 12+14+14.

Question 23

Many students appeared to read the question carefully and produced a simple well organised solution for full marks.

Many who could not complete the question were able to make a creditworthy start to part (a), usually for finding 150g of flour was needed for 15 biscuits, or for deciding that 60 ÷15 would tell them how many batches of biscuits were needed, although this was not always given as 4 as a counting error often occurred, with 15+15 = 30, 30+30=60 and so 3 batches are needed.

Many students also found the amount of butter required while doing part (a) and went on to score full marks, but others did not label their quantities and became confused when attempting part (b). Students should be advised to set out their working carefully with values and mark what values represent, again to aid their own working but also to ensure correct methods in longer question can be clearly seen and part marks awarded.
A few students tried to use a unitary method here, many mixed up the ordering but some did use it correctly although premature of rounding often meant that their answer was not accurate enough, in these cases process marks were awarded.

A common error seen in part (b) was to confuse butter and flour and use 600g of flour so 3 packets. Occasionally 100g was used as the butter, if this was clearly stated and then 1 pack required a process mark could be awarded.

As stated in the mark scheme instructions and general guidance, if 2 was given on the answer line but came from incorrect working no marks were awarded.

Question 24

This question was attempted by almost all students and some fully correct answers were seen. The modal mark was however one.

Very few students listed all factor pairs successfully but most were able to find at least 4 correct factors of both 72 and 90. Many found prime factors but were not able to translate this into a correct final answer.

The most successful students were those who used prime factor decomposition and a Venn diagram. There was still a bit of confusion between factors and multiples here with the LCM of 360 given as the answer. 6 and 9 were common answers, often without any indication of working out.

Question 25

Most students made an attempt at this drawing question, but some just tried to put the plan, side and front elevations into one figure.

Dimensions, when included, were usually correct, but many cylinders did not have the dimensions shown, which meant the accuracy mark was often lost. Students should be encouraged to re-read questions to check they have satisfied the full requirements.

Question 26

This question on the whole was not very well answered, as most students did not correctly reflect shape A in the x-axis. Many students had answers of -6 and -5 (seen in either order) which does not take the reflection into account, but is a translation vector for (3,2) to (-3,-3). Students who drew the reflection on the diagram were often able to achieve two or three marks, but it is clear that students need to develop their skills in multiple step transformations, clearly showing each transformation one step at a time.

Question 27

This question was not well answered.

Many students were able to obtain one mark for calculating the number of each colour pen but then failed to progress any further with anything creditworthy. A common incorrect method seen was to add together 7, 3 and 4 and to divide 212 by the sum of the parts as they would to divide into a given ratio. It was common to see 212 ÷14 and then an answer of 60.
Some students did put 24 as an answer but did not always support this with working and all the three figures of 14,15 and 24 were required for the first mark. Again, a good number of arithmetic errors were seen in this question.

Question 28

Many students were able to score marks on this question. The starting point of calculating *PQ* as 4.5 cm was often seen. Those students that understood they then needed to use the perimeter of *ABCD* were usually able to find the required answer, with a small number making arithmetical errors. Some could not calculate 17 ÷ 2 or 26 − 9 accurately.

Some tried to start with rectangle *ABCD* using trial and improvement to find the lengths of sides. Some, just guessed the sides of the rectangle, usually 10, 3, 10, 3 whilst others divided 26 by 4 to give a final answer of 6.5. A method of trial and improvement cannot score marks unless the fully correct answer is seen.

For those who did not get the correct answer some struggled to understand the connection between the area given of *PQRS* and the side length. Many used the side length of 10 on the rectangle *ABCD* to give an answer of 3.

Question 29

This question was not well answered. There were some blank responses seen. It is not clear if the terms ‘turning point’ or ‘roots’ were understood by some students.

Part (a) was usually correct or blank.

Many who gave answers to part (b) stated all the intercepts with both axes or tried to give coordinate solutions. A few students tried to solve the quadratic algebraically, usually unsuccessfully.

Summary

Based on their performance on this paper, students should:

- take care when carrying out arithmetic operations, checking answers to avoid careless errors
- set out working clearly for all questions, particularly those with three or more marks
- practice answering ‘explain’ and ‘give a reason for your answer’ type of questions
- practice working with questions involving the speed-distance-time formula and working in

fractions of an hour and decimal equivalents of time

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