Pearson

Examiners' Report
Principal Examiner Feedback

Summer 2018

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

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

Introduction

The paper was accessible to students who had been prepared for a foundation GCSE Mathematics paper. There were some questions that were not well answered especially those requiring an explanation. The poor use of mathematical terminology did prevent some students from scoring marks.

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.

This paper allowed the use of calculators but still simple arithmetic errors were seen indicating that students are not always using their calculators effectively. The timing of the paper and the numbers used in questions do expect students to use their calculator and those that do not may indeed disadvantage themselves.

Report on individual questions

Question 1

There were a significant number of blank responses to this question.

Question 2

15.9 was a very common error; 2.0 was also sometimes seen.

Question 3

This question well answered with the vast majority of students just giving the answer without working so presumably using their calculator effectively.

Question 4

Whilst the majority of students gave a correct answer there were a good number of incorrect responses; a few used numbers such as 4327.23 which was acceptable. However, those students that were incorrect often used fewer than 6 digits or occasionally more than one 4 in the answer. It is worth centres asking students to be careful with the placement of commas and decimal points as some were very difficult to decipher.

Question 5

This question involved converting between metric units; some students still struggle with this as a concept. Part (a) was often correct although a popular incorrect answer was 3.5, suggesting the student had divided by 10 instead of multiplying by 10.

Part (b) saw a variety of answers including 77, suggesting that some students used 100 millilitres in a litre. The placement of the decimal point was not always clear and centres are asked to remind students to write as clearly as possible to ensure their answers are correctly interpreted.
Part (c) was not as well answered as parts (a) and (b); only 50% of students gave the correct answer. Students seem less comfortable with the knowledge that there are 1000 grams in a kilogram. When correct, the accuracy of this answer may have been helped by the fact that multiplication was required for the conversion.

Question 6

The majority of students were able to give at least one correct answer and many both correct answers. However, there was little evidence of students approaching the question systematically by listing factors of 36, multiples of 3 and odd numbers, so few method marks were awarded.

The most common error was to give at least one even number in their answer. Students sometimes wrote out factor pairs of 36 and then chose two of them. Common incorrect pairs were 3 & 12, 4 & 9, 6 & 12 and 6 & 9.

Question 7

This was generally well attempted with most students realising that they needed to find different combinations of the three names, many using abbreviations particularly M, Y and L. Whilst many students were able to correctly identify the 6 outcomes, a significant number gave fewer than 6, often stopping after just 3. Students who listed the outcomes in a systematic way were more successful, with those using a random approach often repeating an outcome or listing only 5 outcomes.

Question 8

The majority of students showed appropriate working hen working through this problem which allowed them to pick up at least three process marks even if accuracy or one stage of working was not correct. Calculating the cost of rulers was very successful. Occasionally students would miss out one item when adding up. A variety of approaches were seen but when using the cost per item method many students rounded too soon which meant losing the final accuracy mark. The most common errors seen were in the incorrect use of place value e.g. 90p being added as £90. Also incorrect addition suggested that many students did not use their calculators appropriately for this question. Another common error was to multiply everything by 30 or to multiply 0.82 by 6, rather than by 5.

Question 9

Part (a) was answered well by students, with 186 ÷ 3 often written in the body with 62 on the answer line. There were a lot of distance, speed, time triangles, but not all were correct and those that were written in the correct orientation were not always used correctly. Some students chose to convert 3 hours to 180 minutes and then do 186 ÷ 180, this gained the method mark but not the accuracy as the answer was required in miles per hour. The most common error seen was to multiply the figures. A few students did not use their calculator and tried to round the given figures; this was not appropriate for this question. For this question an exact answer was required. If students are expected to estimate they will be told to do so in the question.

In part (b), as with part (a), the majority of students worked correctly with the relationship between distance, speed and time and arrived at the correct distance travelled in 4 hours. A small number divided speed by time or converted the 4 hours to minutes before doing speed × time. These students arrived at answers of 14.5 or 13920, both results being very unrealistic for the distance travelled by a car in 4 hours. It is a good idea for students to check answers at the end to see if they are sensible.

Question 10

In part (a) students tended to list all odd numbers in the range 20 to 30, no doubt with the intention of identifying those that were prime numbers. Unfortunately, one or more numbers not prime were often included in their final answer. The most common misconception was to believe that either 27 or 21 or both were prime numbers. Some students did not read the question correctly and listed all the prime numbers up to 30. Others ignored the range given and listed prime numbers below 20.

In part (b) both a decision and an explanation were required. It was answered well by some students but the majority were unable to use appropriate mathematical vocabulary to support their decision, such that whilst they could demonstrate some understanding that even numbers are divisible by 2, the statement was incomplete or referred to a single even number other than 2 and did not refer to even numbers in general. Common incorrect statements seen were that other even numbers divided into 2 or even numbers go into 2, rather than even numbers are divisible by 2; these gave some, although confused, evidence of understanding. Lots of responses repeated the statement that '2 is the only even prime number', which did not answer the question.

Many students clearly defined why 2 is a prime number but again didn't explain why it is the only even prime by not referring to other even numbers and therefore giving an incomplete statement. A small minority stated that 2 was not a prime number or continued from part (a) and said prime numbers had to be between 20 and 30. It was also interesting to note that a significant number of students gave the wrong decision and stated that there were other even prime numbers, usually followed by a list of what they believed to be prime numbers, 26 was a popular choice for another even prime number.

Question 11

This was well answered and all three parts had similar success rates. Centres should remind students to put their final answer on the answer line. This is particularly useful when students decide to show the correct answer and a check. Examiners cannot be expected to extract the correct answer from a list of calculations. The value of the unknown must be clearly communicated.

Question 12

Most students attempted the question in some way. A significant number realised that the total was 36 and so multiplied each value in the 'number of fans' column by 10. Many were then able to transfer the information to the pie chart with the angles drawn to the required accuracy; there were almost no examples of a student with correct calculations not attempting the pie chart. Most students who were able to calculate the angles correctly were then able to accurately construct at least one angle. Although some evidence was seen that students did then not know how to use a protractor to complete the pie chart, sometimes measuring 70º instead of 110 º or 100 º instead of 80.

It was also evident that not all students used their ruler to draw the sectors. Most of the students who drew a correct pie chart also labelled it correctly.

Question 13

Many correct answers were seen with the most common correct answer being $\frac{338}{350}$, sometimes simplified to $\frac{169}{175}$. Expressing the answer as a percentage was also seen, i.e. $\frac{12}{350}$ x 100 = 3.4% and 100 – 3.4 = 96.6%. The correct decimal answers were rare. Most students started well and often found 350 – 12 =338 but then were confused as to what to do with 338. Some ignored the value altogether and chose to write $\frac{12}{350}$ as their answer on the answer line, which then scored no marks. The most common incorrect answers were to give the probability that she won the raffle as $\frac{12}{350}$ or $\frac{6}{175}$, or to calculate 350 ÷ 12 = 29.16.. or to or try to work with percentages with either 350 ÷ 12 = 29.16% or 100 – 29.16 = 70.84%.

Question 14

This question was well attempted, with many gaining full marks for correctly interpreting the question and showing the ability to calculate the missing values and place them in the frequency tree correctly.

Of those who were not awarded full marks, the vast majority were able to correctly place at least one of the given values, and then able to calculate at least 1 or 2 of the missing values. However, these were often located in the incorrect place in the frequency tree, showing a lack of understanding of what those missing values actually represented or an inability to re-read the question and check where to put the individual answers.

The most common numerical mistakes tended to be made on the last branch for males, for example a common incorrect answer was to divide 22 by 2. 23 and 18 were the most common 'calculated value' seen. Students preferred not to show any working out and most of the time the answers in the frequency tree were not backed up by calculations, provided the values given were correct this wasn't a problem. A minority of students completed the frequency tree with probabilities rather than frequencies.

Question 15

For part (a) students' responses varied considerably with about a third of students able to demonstrate an understanding of the angles facts around isosceles triangles and managing to articulate that *x* was not a base angle. Some students worked out the value of *x* to be 54 degrees as a way of showing it not to be 63. A substantial number of students attempted to explain that if *x* was 63 degrees and the two other angles were the base angles of the isosceles triangle and so also 63 degrees then the triangle would make 189 degrees which is too much. Three letter angle notation was seen, for example stating that it was angles CBA and CAB which were equal however some students used two letter line notation when describing angles e.g. angle AC is equal to angle BC which is not acceptable.

A large number of responses related to sides rather than angles with many stating they were 'parallel'. Some responses demonstrated confusion between the different types of triangle and their properties. A small number of students stated incorrectly that this was not an isosceles triangle. A lack of mathematical reasoning continues to prevent some students from gaining marks when explanations are required. This type of communication is a mandatory requirement of this specification and so centres are advised to practice these types of questions and the associated vocabulary.

In part (b) the student could either give the correct reason William used or identify the incorrect reason given and some then attempted to correct the incorrect reason. In this question all approaches were acceptable. Unfortunately, many incorrect answers were seen, for example, many students referred incorrectly to opposite angles being equal or that corresponding angles are not equal. Also, students continue to use incorrect language for alternate angles such as alternative angles or 'Z' angles. Mark schemes should be used by centres to see the correct terminology expected in these types of questions.

Question 16

On the whole, a very well answered question with many students achieving full marks. The number 5 was usually seen in the table with limited working. Occasionally 5 was a rounded answer from incorrect working and so could not gain the marks. A common misconception was to add all the buttons and divide by the sum of the frequency or to look for a sequence of numbers in the frequency column. Unfortunately, some students reached an answer of 95 but then did not divide by 19; these students scored only 1 mark.

Question 17

There were a variety of approaches that students could use to answer this question, with many choosing to calculate the maximum number of batches that could be made with the amount of ingredients available, some rounded to whole batches whilst others used exact figures, both were acceptable. The majority of students were able to identify the ingredient that provided

the limiting factor, with many successfully continuing to show a fully correct method to **test all ingredients** and conclude that 90 was the most biscuits that could be made.

However, some students chose to work with just one ingredient often the butter and gave an incorrect answer of 120 biscuits. Others worked out all the batches but then failed to multiply by 30 and so did not have a complete method for the number of biscuits possible.

Another common error was to find the correct number but then add up how many biscuits could be made with each ingredient to give an impossible total from these ingredients.

Students who chose to use a unitary method were often unsuccessful in calculating accurately to reach the correct final answer, sometimes through arithmetic errors, other times through rounding prematurely.

Although the question stated clearly that working **must** be shown, a significant number of responses arrived at the correct answer but failed to gain full credit due to not showing any justification involving all ingredients to support their final answer.

Question 18

Students generally recognised that the transformation shown was a reflection. There were a variety of ways to describe this - reflect, reflected, reflection. Some used the incorrect statement of mirrored or flipped. Many were unsure how to describe the y-axis and a number used expressions such as $y = 0$, line y or even point (0,0). Some even gave column vectors, thus confusing a reflection with a translation. There was a requirement for a single transformation and many students gave more than one transformation; this did not score any marks.

Question 19

This question proved challenging for many students and some blank responses were seen.

This was a problem solving question where a fully correct solution would involve finding three costs, for the labour, the fencing on the straight edge and the fencing around the semi-circle. This final aspect was often not found. It was common to see responses that confused area and circumference for the circle.

The most successful start seen was to calculate labour cost for three days i.e. £180 × 3 = £540. Also, many of these students were able to work out one cost 50 × 29.86 = 1493 and then add two costs which resulted in the award of three process marks. Other students used a structured approach to calculate the perimeter of the semicircle but forgot to add the diameter length when calculating the total perimeter of the semicircle.

Overall students who attempted this question seemed to miss out one aspect of the question. Students are advised, especially on the longer questions, to continually refer back to the question to check they have dealt with all the aspects of the problem set.

Question 20

Most foundation students were able to answer part (a) however, they found part (b) particularly difficult. The most common incorrect answers in part (b) were $5np^9$, $5np^6$, $15np^9$ and $15np^6$. Where students were awarded 1 mark it was usually for $125np^9$

Part (c) was also difficult for the majority of the foundation students. Many did not apply the index laws correctly and often divided the powers as well as the numbers instead of subtracting the powers. The value 8 was sometimes seen but no other term was usually correct. Some students even failed to simplify $32 \div 8$ correctly, writing the answer as 28. The most common incorrect answer was $8q^3r^4$, whilst the most common responses scoring 1 mark included $8q^6r^4$ and $28q^6r^3$

Question 21

For part (a) the most successful students were those who listed multiples of 40 and 56 and identified the lowest one common to both lists. Many students broke down the two numbers into their prime factors but were unable to use this to find the lowest common multiple. A very common incorrect answer given was 2.

Part (b) was not well understood by many students. The most common incorrect responses were 30 or 120. Very few students realised the relationship between prime factors and the HCF. Many found the values for A and B of 120 and 300 then decomposed into prime factors using factor trees; not recognising that they had already been given this information. Others attempted to find the LCM instead or just gave a factor of both numbers, often 5 as this was the highest prime factor but 3 and 2 were also seen on the answer line.

Question 22

This question was not answered well. Many students did not attempt the question or just wrote down 2 and –6, sometimes as a coordinate pair or they just ringed these figures in the diagram. This did not usually lead to any meaningful working but sometimes led to the incorrect answer $y = 2x–6$, just using the x and y intercepts. Some students drew an appropriate triangle on the diagram but did not know how to use it, others did use it to find the gradient. However, few then went onto use this value correctly in an equation. It was also relatively common to see $y = mx + c$ written but working showed that the student had little understanding of what this meant or how to use it. If the gradient was correctly used a common wrong answer

was $y = 3x + 2$ where the x intercept was used rather than the y intercept. A significant number of students did try to use L in the equation rather than y or with both x and y.

Question 23

This question was attempted by the majority of students and the full range of marks awarded.

Many students scored one mark for either finding the total of the monthly payment or the 20% VAT. Many were able to show both of these skills and so scored two marks. It was pleasing to see a significant number of students able to find the deposit and thus score three marks. Some did engage with the ratio and the fourth and fifth marks were awarded to some of these students.

The common errors seen were to try to partition by finding 10% of 8500, this often led to an incorrect answer of 85. Some just did 8500 – 6375 and did not engage with the percentage at all.

A number of responses reached 51:85 but then stopped there evidently not being able to cancel any further. A few students tried to work in monthly values and then put these into a ratio. This method was rarely successful.

Question 24

Fully correct answers were rarely seen. Part (c) was often left blank.

Many students were able to achieve at least one mark on part (a). This was usually for finding the correct y coordinates using the positive values of x. Correct values for the negative x values were much less frequent. Common incorrect answers were –8 and –6. The use of negative values is often a weakness particularly when used in in calculations using a calculator. Also, centres should remind students that if their calculated points do not fit onto the given scaled grid then they should check their calculations carefully.

In part (b) students who had values in their table were often able to plot five of their points but the mark for this was dependent on one mark being awarded in part (a). Of those students who were able to plot all of the points correctly most did join them with a smooth curve. A few students used line segments to connect points; a smooth curve is required for the accuracy mark.

In part (c) not many students drew $y = -2$ and many scripts were blank. Some students tried to calculate a solution to the equation but very few showed any meaningful working.

Question 25

The majority of students were able to calculate either the original pressure or the new pressure or both but most failed to engage with the percentage.
There was often confusion between cm squared and squaring leading to some students clearly showing and calculating $70 \div 20^2$ instead of $70 \div 20$.
Those students that did find comparative values, usually made the correct decision but it was common for students to make a decision without having found values that could be compared. A few students made the wrong decision despite having correct values.

Question 26

This question was not well answered with many students just working with the dimensions given and calculating $7.2 \times 8.4 \times 18$, or sometimes going on to divide this value by 2.
Those students who recognised this question required the use of Pythagoras's Theorem had mixed success. Some students used $8.4^2 + 7.2^2$ but a good number of correct processes and values were seen.
Once the correct values were found students chose one of two options: some just found the volume of the cuboid using height, width and depth of the prism but others chose to find the area of the triangle, they then tended to go on to receive full marks for correctly using this to find the volume of the prism.

Summary

Based on their performance on this paper, students are offered the following advice:

- learn and be able to use metric conversion scale factors
- take care when entering negative numbers into a calculator particularly in conjunction with the 'square' button
- show all working and consider the final answer to check if it is reasonable for the context of the question
- ensure that the definitions of mathematical terms such as prime and HCF are known
- practice 'explain' and 'give reason' type questions

Grade Boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link:
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