Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

November 2021

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 with a good amount of working shown over most of the paper. Some questions, towards the end of the paper, were not as well answered by students but this was due to the differentiation and ramping of the paper. The lack of responses at the end of the paper is in line with normal practice for a November series and all questions were accessible and answered by some students.

It was pleasing to see that many students showed their working out, but it is worth noting that some students do not do this and where questions request working marks will be withheld if answers only are shown. This is a paper that requires the use of a calculator and students are expected to have access to and use a calculator. There is evidence that some students continue to try to use written methods even when they have a calculator and this can take longer and also lead to inaccurate answers.

Reports on Individual Questions

Question 1

This question was very well answered with the vast majority of answers being correct. A few incorrect answers were seen with $3\frac{1}{10}$ being one of the incorrect answers given.

Question 2

Students do find conversions difficult and even at this simple level approximately a third of the students gave an incorrect answer, with 3000 being a popular incorrect answer.

Question 3

More students were successful on this question than on question 2. The vast majority were able to correctly order the decimal figures given.

Question 4

In part (a) there was generally one of two answers given here, either $4m$ or m^4. The incorrect answer was popular and only about two thirds of the cohort gave the correct answer.

Part (b) was answered more accurately with over 80% of the cohort giving an acceptable answer.

Question 5

This question was well answered, with most students scoring the 2 marks available. The most common incorrect responses were either to draw a 6cm by 3cm rectangle, seemingly from counting the grid lines rather than the squares, or to draw either a 5cm by 1cm rectangle or a 5cm by 5cm square. When full marks were not awarded, a mark was often achieved for engaging with the scale given by either drawing a diagram with one dimension correct or by calculating both dimensions correctly.

Question 6

In this question part (b) was more often correct than part (a).

In part (b) almost all answers were correct with just a few students giving 16 as an answer. Whilst this is a multiple of 8 it was not in the given list. However, for part (a) a wide range of incorrect answers were given using numbers from the list and it was disappointing to see that almost a third of the cohort could not recognise 25 as a square number.

Question 7

This question was generally well answered with many correct answers seen. The major problem seen in this question was students stopping after subtracting 940 from 2500 and not dividing their answer by 2. This working allowed one mark to be awarded. The other issues seen in this question was arithmetic errors or some students thought that there were two bags of 940g so the third bag was 620g.

Question 8

A high proportion of students added the correct heights to give 35 and many went on to gain full marks by dividing by five. A few divided by six, so only gained one mark, and there were some arithmetic errors and misreading of the y-axis, causing the accuracy mark to be lost.

There were also some students who used both the frequencies and the numbers on x-axis adding a mixture of both or adding all together whilst others incorrectly multiplied the number on the dice by the frequency. All these methods were incorrect and did not score any marks.

Question 9

This question was answered very well with many students scoring the communication mark available. The most common correct responses were to perform the correct calculation stating that the true answer was 14 and state that multiplication should be done before addition. Many students wrote BIDMAS or BODMAS as part of their response and often giving the correct answer of 14 as well. Where the mark was lost it was often due to contradicting information being used or a calculation being shown which did not give the correct answer (14). Some students said that 20 was actually correct and scored no marks for just re writing the working given.

Question 10

Three quarters of the cohort gave a correct answer to this question. The common incorrect answer was to just write down a decimal answer.

Question 11

Many students scored both marks on this question correctly drawing the reflection in the mirror line. Only a few students drew a correct reflection using an incorrect mirror line to score the method mark only.

It was disappointing to see responses that scored no marks, the most common error was to attempt a rotation of the shape or a translation of the original shape to the bottom left-hand side of the grid. These incorrect transformations scored no marks.

Question 12

It was pleasing to see that a high proportion of students gained full marks on both parts of this question.

A common incorrect answer to part (a) was 0.9156… from $\frac{\sqrt{13.82}}{4.06}$ i.e., failing to square root the whole calculation, this gained no marks.

The students that wrote down intermediate stages in their calculations could gain a mark for their working eg $\sqrt{13.82} = 3.717$….

Some students lost the mark for part (b) by writing 1.8, rather than 1.84. It was pleasing to see that many students gained the mark in part (b) by correctly rounding their answer, even if incorrect, from part (a).

Question 13

The majority of students scored both marks in part (i) calculating the angle to be 21 degrees. A small number of students used 360 in their calculation instead of 180 and this resulted in an incorrect answer of 201 degrees. The other error most often seen was arithmetic, again suggesting that students may have been reluctant to use their calculator for this question.

Part (ii) was less well answered. Students who did score the communication mark often wrote 'angles on a straight line add up to 180'. The mark was most commonly lost for missing out the word angles, other incorrect response included, 'half a circle is 180', here neither angle nor line were mentioned. However, the most common error was for students to state or re state their numerical calculation without mention of geometrical properties. Centres should encourage students to write short succinct explanations.

Question 14

The vast majority of students answered both parts of this question correctly, demonstrating a good understanding of the skills being assessed.

In part (a) many did gain the first mark by stating an answer within the range of 14 to 16. A common error seen was to read off the value of 75 for 5 hours but not make the adjustment to a payment for one hour or not being able to interpret the divisions on the scale correctly as £2 per square, with £10.60 being seen frequently. A very small number of students added together readings for 1, 2, 3, 4 and 5 hours.

The most common and successful approach to part (b) was to use their hourly rate found in part (a) and multiply by 36. A build up method using one or more readings from the graph was less common and less successful, particularly as many using this method only found the pay for 35 hours by using the reading at 5 hours and not adding an extra hour of pay to show a complete build-up.

Question 15

This question was not so well answered and proved quite difficult for many students. Those who gained both marks usually did so by converting the given fractions to decimals first then ordering correctly.

However, many students only achieved one mark usually as a result of incorrect or incomplete conversions. It was common to see $\frac{3}{5}$ and $\frac{5}{8}$ correctly converted to a decimal but when converting the other two fractions students often only worked to 1 decimal place hence losing accuracy and gaining two values of 0.6 to compare. This method allowed the award of the method mark only for two correct conversions.

Others showed no working but did list the fractions and some did so correctly, a high risk strategy, others with no working often scored one mark for three fractions ordered correctly.
A small minority tried to work with equivalent fractions but this method often broke down and was rarely successful.

Question 16

This question required students to interpret a pie chart, firstly to find the number of cars being represented in a sector followed by calculating a probability, with many finding both parts of the question challenging.

A range of approaches using either knowledge of the number of degrees in a pie chart or using proportionality could gain credit, with the most successful approach appearing to be to use an appropriate method to find the number of degrees per car or per 10 cars. However, many deducted the number of degrees difference for the two sectors from the number of black cars arriving at the incorrect answer of 125 or dividing by 10 rather than 9 when working with proportionality. Very few identified that the whole pie chart represented 540 cars and used this to work out the number represented by 80 degrees.

Students were required to combine knowledge of probability with interpretation of the pie chart in part (b). Whilst many gained a mark for using 50 as the numerator in a fraction, the majority were unable to also give a correct denominator. Common incorrect denominators included 100, presumably using percentage, or 360 from using the total number of degrees in a circle.

A small minority of students are still expressing a probability as a ratio rather than a fraction, decimal or percentage. Centres are encouraged to promote the use of fractions for probability in this type of problem.

Question 17

It was common to award 2 marks or full marks for this question. Students often correctly placed 38 or 15 for the first mark and therefore went on to calculate or place 22 or 7 for the second mark.

Many students then failed to attempt to find 60% of 60 but when they did they often went on to correctly complete the rest of the question. The most common error was to find 60% of the wrong value (usually 38). Some students gained a third mark by simply showing that the total number of texts was 36 but not using it in the diagram, this skill in working with percentages was enough for the third mark.

Some responses had the correct numbers misplaced in the tree diagram and students should be encouraged to check their answers thoroughly. These students did gain some marks for working but could not gain communication and accuracy marks.

Question 18

This problem presented students with a slightly different approach to testing frequency tables and the question was well answered by many.

When partial marks were awarded it was often for finding the total length of the planks represented in the table, continuing to subtract from 92 to find that the 2m lengths equated to 26m and then losing the final mark due to either forgetting to divide by 2 or because of arithmetic errors.

Common incorrect approaches seen included adding the frequencies and subtracting this from 92, giving an answer of 55 or using a combination of adding both columns of the table. Less commonly seen incorrect approaches included looking for a pattern or sequence from the frequencies provided, usually arriving at 11, or giving an answer of 20 due to assuming that if 10 planks represented the 1 metre lengths then 20 planks must represent the 2 metre lengths.

Question 19

This was a very accessible problem and allowed students to score a range of the available marks. The modal score was full marks.

When full marks were not scored a common approach for this question was to find Rachel's share (£240). Many then incorrectly calculated Samina's share as ¼ of £240 or ¼ of 600 and not ¼ of (£600 - £240) as required. This then obviously led to Tom's share for this method being incorrect but most students did find $600 \div 3 = 200$ and so gain the third process mark.
Of those who correctly calculated all three correct shares, the majority went on to gain the communication mark by giving a correct conclusion and accurate comparative figures. A few gave confused or ambiguous statements; again, succinct statements are recommended.

Question 20

Both parts of this question were similarly accessible to students. Approximately half of the cohort got each part correct. In part(b) the most common incorrect answer was d^7

Question 21

The first part of this question was beyond most students and many failed to use any reasonable inequality notation.

In part (b) The most commonly awarded score was 1 mark for either a line of the correct length and position, a closed circle at −3 or an open circle at 4, which was seen less frequently. Some knowledge of inequalities was demonstrated but the accuracy mark was often lost due to not knowing how to translate the inequality symbols into open and closed circles correctly. Whilst it was common to see a circle shown at −3, sometimes correctly closed, the majority of incorrect answers terminated the line with an arrowhead at the number 4.

Question 22

The majority of responses to the first part of this question scored at least one mark and a good proportion gave the correct answer of 12.

When one mark was gained it was for the sight of one or both factor trees, but some students did not know how to use the results and so did not go on to gain the accuracy mark.

The most successful method seemed to be listing factors and extracting 12 from the list.

Part (b) was not so well answered but as with part (a), many students gained a method mark for a factor tree, but then were unable to use the results correctly. The most successful responses were from those who listed multiples of 24 and 40. A few students did confuse HCF and LCM.

Question 23

Part (a) of this question was not often correctly answered. Many students were able to correctly identify that they needed to divide distance by time to arrive at the answer but very few went on to convert minutes into hours. Common incorrect responses were often 1.3 or 20. Those students that obtained the correct answer of 80 often did so by scaling ie multiplying 20 by 4.

It would be beneficial for centres to ensure students are confident answering questions involving compound measures.

Part (b) was often awarded part marks with only a few students scoring all the marks for a fully correct graph. Those who scored one mark often did so by drawing the correct horizontal line for the stop in Sam's journey. A few students scored two marks for drawing a line representing the correct distance travelled in the last 20 minutes but forgot to show the stopping time on the graph.

Rarely was 25 seen as part of calculations and a common error seen was for students to continue their line to (1050,50).

Question 24

This question was not well answered. Many students continue to find working with negative numbers difficult and hence 5 was rarely seen in the correct place in the table, 3 was the most popular incorrect answer.

Students were usually able to plot their points but far too many did not join them with any form of a curve.

Because few quadratic graphs were drawn the answer to part (c) was often blank. This question is at the higher levels required on the foundation paper and so its lack of success is not surprising. The correct answers seen were from drawing a line at $y = 4$ but even with this line most students then just read off the positive answer and so still only gained one mark.

Question 25

This multi-stage problem proved challenging for the majority of students, with very few scoring any marks.

A small proportion recognised that the application of Pythagoras' Theorem was required, with a common incorrect method being to only perform addition or multiplication of the 2 lengths given. Partial marks were occasionally awarded for showing that squaring and adding the 2 side lengths was needed but many failed to continue correctly to square root to find the hypotenuse. Of those who were able to find the missing side length, it was rare to be able to break down the stages needed to find the total perimeter. The main challenge appeared to be recognising that one part of the perimeter was the difference between the length of the hypotenuse and the side of length 10cm. Some students found the total perimeter of one of the triangles and multiplied by 2.

Question 26

Neither part of this question was well answered ad there were a disappointing number of blank responses.

A few students indicated the recognition of the need to use trigonometric ratios. Of these, some wrote down SOHCAHTOA or drew "formula triangles" but were not able to select the most appropriate ratio to use.

Students who correctly identified they needed to use the tangent ratio in part (a) normally scored both marks. When only 1 mark was awarded, the final mark was often lost due to poor application of the calculator for example the calculator was not in degree mode.
The most common incorrect approach seen was to use the sum of the angles in a triangle by subtracting 90°and 34° from 180°, despite the question requiring a missing length to be calculated. Some attempted to use Pythagoras, squaring the 34 and the 12, mixing angles and side lengths was seen.

Part (b) was very similar to part (a) in the quality of response. For those who realised the need to use trigonometry many did not identify the correct ratio to use or know that the inverse function was needed in order to find an angle. Although $\frac{15}{18} = 0.83$ was sometimes calculated and formed part of the working, this was insufficient for credit to be given as a correct equation involving $\cos x$ was required.

Some students gave an answer of 34 which had evidently come from assuming the angles in the diagram from part (a) were the same as 90 - 56 was also seen as the working.

Less often seen was an answer of 33 from adding the side lengths. Another common incorrect answer of 45 came from assuming the triangle is isosceles. Some attempted to use Pythagoras's Theorem but were unable to complete the alternative approach far enough to be credit worthy.

Question 27

Only a few students recognised that factorising was the most suitable method to solve the quadratic equation. Of the students who did manage to factorise some were unable go on to solve the equation and identify the two correct solutions. Some students found the solution of 9 by a substitution method, so gaining one mark for $x = 9$

Many tried to 'solve' the equation by rearranging to isolate x by adding 18 or $7x$ to both sides, clearly this led to no marks being awarded.

Question 28

As the last question on the paper it was not surprising to see that students found this question challenging. The overwhelming number of responses to this question was £312800, coming from a variety of methods to find 115% of £272000. Occasionally 85% of £272000 was seen, usually from £272000 – (15% of £272000).

The fact that what was required was 100% when the given figure was actually 85% was rare. Those who did recognise this usually went on to gain full marks.

Summary

Based on their performance on this paper, students should

- carefully read questions
- practice questions involving negative numbers
- give succinct explanations
- use a calculator.

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