Examiners' Report
Principal Examiner Feedback

November 2022

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

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Mathematics (1MA1/2F)

Principal Examiner Feedback

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.

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 much that students continue to try to use chunking methods when working out percentages even when they have a calculator. This can take longer and often leads to inaccurate answers through incorrect combining of chunks.

Students should read the questions carefully and ensure they fully answer the question asked. Some problems are set in small real-life situations (non-mathematical settings) and it would be beneficial for centres to ensure all students have a working knowledge of reading timetables and working with different types of bills.

Reports on Individual Questions

Question 1

A good accessible start to the paper. This question was well answered with most students scoring the mark.

Question 2

This question was well answered, with nearly all candidates scoring this mark.

Question 3

Students found this question slightly more challenging. Even so, the majority gave the correct answer.

Question 4

In line with previous series students found this conversion question more difficult. Just over half of the cohort were able to do this simple conversion. Centres are advised to spend time on this skill as it is often required.

Question 5

3674 was the common inaccurate answer and students are advised to carefully read the question being asked.

Question 6

The majority of the cohort were able to accurately measure the line but less were able to measure the angle. Centres are advised to ensure candidates have the correct equipment and can use it effectively.

Question 7

Generally this question was answered well with the vast majority of responses gaining some marks and the modal score was full marks.

While 49.01 or 4901, forgetting to convert to pounds was often seen, the most popular incorrect approach was to divide by 13 rather than multiply. Another error seen was to add the two mileage figures.

Even students that did not know how to interpret the real life setting of the question often gained the B mark, many with the use of 0.13 in a calculation.

Another issue seen was arithmetic errors due to students trying to work without a calculator. Please encourage students to use calculators on papers 2 and 3 as they are designed for calculator use.

Question 8

This question was very well answered with only a very few students failing to full marks. The main errors seen were arithmetic.

Question 9

Most students were awarded full marks. Of those not scoring full marks, a common error was with the linear scale. Many chose an appropriate linear scale of one square to one unit, although there were some candidates who labelled the spaces rather than the lines and others who did not start their scale at zero which often resulted in the 3 bar being only 2 squares high. Other errors with linear scale included using a scale of 3 to a square or 5 to a square, which caused issues when drawing their bars as it was difficult to clearly represent all of the frequencies.

Centres should give students practice in identifying an appropriate scale when drawing graphs

Question 10

Part (a) was answered well with most students gaining at least the first mark for correctly selecting the arrival time from the bus timetable with the intention to subtract. The accuracy marks were usually lost for arriving at a value of 89, using 100 minutes to the hour. The most successful working showed the use of timeline diagrams or used a build up or chunking method. Encouraging candidates to show working and use of the time function on a calculator would be beneficial to centres.

Part (b) was variable for students, with many completely correct answers seen, the best often showing a sound understanding of the concept of the question with some excellent annotations. A step-by-step approach for the journey worked best here and again, timeline diagrams were useful.

However, others only added 7 minutes to 8am and could not select a bus to work with. Others selected the correct starting time but did not read the timetable effectively and gave the wrong arrival time. Some even read across the timetable.

One surprise was the number of students who scored 0 in part (a) and 3 in part (b), often not attempting part (a) but being able to show full working in part (b).

Question 11

This was a well attempted question with most students gaining at least 2 process marks and the vast majority achieving full marks. However, some students did not subtract to find the total number of children first and some, despite the bold print, did not go onto find the number of children not wearing hats.

For those not scoring full marks, it was common that they scored at least one mark for saying there were 200 children. Some students stopped at finding just 35% (70) and so were only able to achieve half the marks.

Common errors were to find 35% of 214 and another common error was seen when students did the build-up method for percentages. Most candidates using this method did not show what calculations they have done and so, unless their answer is correct, can have no method marks.

Centres would benefit from reminding students of the need to read the question carefully and check that their answer is reasonable. They should also be reminded to show their working out to find percentages as students often made arithmetic errors without showing the associated calculations.

Question 12

Part (a) of this question was well answered with the majority successfully calculating the correct answer. Common errors leading to no marks being awarded were to change $\frac{5}{8}$ to a decimal and divide or to divide by 5 before multiplying by 8. Some arithmetic errors were seen but these were rare.

In part (b) the majority of students gained at least 1 mark for correctly ordering three of the four fractions or correctly converting at least 2 of the fractions to a common format, often decimals. Of the students that converted the fractions to a common format, the majority correctly ordered all four fractions to gain full marks.

Students should be encouraged to show conversions to a common format as those who were awarded no marks often showed no attempt to convert to a common format.

Question 13

Students attempted this best buy problem with varying levels of success. Two marks was the modal score. As such, partial marks were often awarded for using one or both of the special offers correctly, with many also gaining the third mark for finding a comparable number of pints. This was often for adding the cost of another 2 pint bottle to find the cost of 8 pints in total or, more commonly seen, for finding the difference in cost between the two offers and making a comment about being able to buy an extra 2 pints for only 42p more. However, this type of comparison did not make full use of both offers and so was not a full consideration of the best value offer.

When full marks were awarded, it was often due to finding the unit price of a pint or by finding the cost of 48 pints, but these were less frequently seen. A small number of learners calculated the alternative comparable figure of the pints that could be bought per pound but were unable to select the correct offer due to misinterpreting that the lowest amount was the best value.

Students should be encouraged to use a systematic way of using each type of offer, including to write down the number of items being bought, and ensure that they have used each offer fully before finally calculating a unit price rather than calculating at the difference in cost.

Question 14

In part (a) this simplifying question was answered very well, with the majority of students being awarded both marks. The method mark was often awarded for correctly collecting like terms for one variable but often lost the second mark due to an error when working with $7d$ and $-d$. Commonly seen errors included an extra step to combine $7c$ and $6d$ to get a final answer of $13cd$ or, when working with the d variable, either misinterpreting the negative sign to get $7c - 6d$ or forgetting that this represented $1d$, resulting in $7c + 7$ being stated as the final answer. A less frequent error was to use powers when collecting like terms.

In part (b), students often struggled to expand the bracket correctly by only multiplying 5 by 2m to give 10m but failing to multiply 5 by 6 as well. Students that did correctly expand the bracket generally solved the equation successfully, with almost half of students scoring full marks.

A significant number of students attempted to solve the equation using trial and error rather than algebraic methods. This approach scores either full marks or zero marks and should not be encouraged.

In part (c), responses were encouraging. Students demonstrated a good understanding of how to write the expression $3x + 2y$ correctly, with again almost half of the cohort scoring full marks.

Where candidates failed to gain full marks, some gained one for having one of the terms correct but most failed to score at all. Often this was due to using powers or a subtraction sign or even missing the sign altogether.

Question 15

The marks for this question were well distributed over the full range available.

For part (a) when full marks were not scored the main issues were with the key, omission of a figure, or uncertainty around how to place '103'. Some students were unsure on how to represent this number with some choosing to use 1 in the stem instead of 10 or 100, and/or writing stem as 03. Secondly, some students were unsure of the notation needed to explain the key, with some writing in words and others using various symbols as a separator between the tens and units. Practice of examination questions and emphasise the importance of crossing out the numbers as they place them in the diagram, completing an unordered diagram first, then ordering it allowing them to order fewer integers at once. Students should always check that they have the same number of values in their diagram as there are in the original question, this is an easy way to avoid losing marks.

For part (b), if pupils understood the median, they were generally successful in gaining 1 or 2 marks. A significant number of students disregarded the stem and leaf diagram and re-wrote the list, not appreciating that the median could be read from their diagram, this method did produce many correct answers but would have been more time consuming.

There were common incorrect responses for example calculating the mode, range or mean.

Question 16

Most students gained only 1 mark for an appropriate step to the process, most commonly from 12 divided by 4, but their answers broke down frequently applying direct proportion rather than inverse.

It was also common to see several approaches for this question. From the scripts seen it was clear that students found this question challenging. Going forward students are advised that checking the response to see if it is sensible is a good strategy: "Do we expect a larger or smaller numerical answer?" this will assist the students in dismissing incorrect working and selecting the correct operations needed.

Question 17

This question was not answered well with all the usual misconceptions seen.

A common approach was to find the mid-points of the intervals (usually successfully), add them together and divide by the frequency. Responses where fx was seen frequently broke down by division by 5 rather than 80.

For those students who do calculate frequency multiplied by the midpoint, it is helpful when working is shown so that credit can be given where the answer is incorrect from arithmetic error.

Understanding and checking their answer is sensible would be of benefit to candidates to avoid lots of responses being outside the range of data.

Question 18

Part (a) was answered well, with the majority correctly identifying the coordinates of the outlier.

When the mark was not awarded, it was often due to either selecting (6, 1) as the outlier or for writing the coordinates incorrectly as (1, 2) but this was seen rarely.

Part (b) required learners to describe the relationship shown by the scatter graph and many students were able to correctly describe that as one variable increased, the other variable decreased. Stating negative correlation was also sufficient to gain the mark but of the students who did not describe the relationship in words, some just stated negative or negative gradient and did not use the word correlation. The other popular incorrect answer was to say there was a positive correlation.

In part (c) whilst some fully correct answers within the given range were seen, a large number of students were not able to use the graph correctly. It was common to see an incorrect line of fit being used and a few instances of a line of best fit being drawn from the origin and showing a positive gradient were also seen. Some lines were drawn across from 7 but students did not seem to know how to use this to read off an accurate figure. Centres should ensure students have access to questions involving negative correlation.

Question 19

This question was not well answered and very few full marks were awarded. A proportion of students gained 1 mark for a correct 5 by 3 rectangle drawn in the correct orientation; attempts to draw the horizontal lines to indicate features on the shape were rare. Even rarer was the use of the dashed line to indicate the hidden feature.

This is an area of the specification students seem to find challenging and centres are advised to look at plans and elevations with students, emphasising the need for the internal lines.

Question 20

For part (a) students had mixed success finding the nth term, with almost equal numbers gaining either 0 or 2 marks. Errors made were finding the common difference but not recognising this as $6n$ and stated a response of $n + 6$ or $6 - n$.

Those students who identified $6n$ sometimes paired it with -1 instead of $+1$ or put $6n + 7$ or left as $6n$. A common incorrect answer was $7 - 6n$ which gained no credit.
In part (b) some students were successful in listing the terms of the sequence. But a common listing error was to start with 6 and subtract 8, rather than the other way around.
There were very few attempts to set up and solve an equation. Those that set up the equation $8 - 6n = -58$ were then unable to successfully show that n was 11 as many arithmetic errors occurred.

Centres should ensure that students practising creating equations and solving them, especially involving negative numbers.

Question 21

The majority of students found this multistage problem involving area, proportion and cost challenging, with a wide range of approaches and very few fully correct responses seen. Whilst many students were able to correctly calculate the area of the rectangular sections of the composite shape, very few were able to use the appropriate formulae for the area of a triangle and a circle to find the total area. Of those that did recall the formulae correctly, some used an incorrect dimension for the triangle by using 7cm instead of 9cm and some forgot to divide the area of the circle by 4 to find the area of the quadrant. It was also common to see areas of at least one rectangle being combined with angles of 90°, 180° or 360° for the circular area.

The use of proportion to work out the number of bags needed to cover the area calculated was used correctly by some students, with many gaining a mark for finding the number of bags required to cover at least one correct area. These students often went on correctly to round the number of bags needed to an integer before multiplying by the cost of a single bag to gain another mark. A small number of students didn't round up and therefore gained no credit for finding the cost using part bags.

Students who were the most successful often showed working in a systematic way by splitting the shape into 4 sections before continuing with their calculations. It is important for students to be able to fully recall correct formulae for the areas of a number of shapes and the use of systematic working helped students work through this multistep question.

Question 22

Many students did not recognise the need to use trigonometry in this 2 mark question, with many trying to work with the area, finding missing angles or using Pythagoras' theorem. Of those who did recognise that the use of trigonometry was needed, many selected to use the wrong ratio, with Sine being the most common incorrect ratio used. When the correct ratio was used, the majority of students found a correct answer within the acceptable range.

Of the students gaining only the method mark, it was often due to early rounding of figures. The incorrect use of the Cosine ratio due to writing cos (53×14.5) was occasionally seen so students should be encouraged to practice the correct use of trigonometric ratios and have a better understanding of the order of operations applied.

Question 23

This question required students to calculate with compound interest and a mark was often awarded for calculating the interest for a single year but many did not add this amount on before working with the interest rate for the second year and instead used the starting value of £7000 for both rates before adding the values together. A small minority of students used the second interest rate of 1.5% for 2 years instead of one year.

It was also disappointing to see some students using written calculations to find their answer and practice using a calculator to answer this type of question would be beneficial to students.

Question 24

This question was completed with varying degrees of accuracy. It was rare to give full marks for all parts of the question but many students scored 1 or 2 marks within different parts of the question.

Part (a) was probably answered most, although it was clear that some students did not understand what was being asked as there were a large number of incorrect responses. Some students understood how to identify the y intercept and wrote their answer expressed as a co-ordinate, which was accepted.

In part (b) some blank scripts were seen and it was disappointing to see a significant number the coordinates written in reverse i.e. (– 5, 3) suggesting that the term turning point was understood but the order of the coordinates was the stumbling block.

For part (c) there were a large number of blank responses. When the right number was there it was often in the form of a coordinate. Only a handful of responses gained 1 mark for marking the roots on the graph. It is clear that many did not understand the meaning of 'root' of an equation.

Centres would benefit from reminding students to mark all key points on the diagram. If mistakes are made method marks may still be awarded.

Question 25

Both parts of this question proved challenging for this cohort with very few gaining any marks at all.

In part (a) students did not seem to know what to do so a lack of understanding of the term reciprocal would seem to be the problem here

In part (b) the use of the term significant figures seem to pose more of a challenge then when this type of question is set around decimal places.

Students would benefit from being given examples of mathematical terms they need to know and practice in rounding to a fixed number of significant figures as often as they round to a given number of decimal places.

Question 26

Where students understood the process to calculate the original amount, they were successful in gaining both marks.

Unfortunately the majority of responses saw students increase or decrease the given amount by 9%. Another common mistake was to use 0.91 as a multiplier.

The best solutions came from those who identified 165680 as 109% at the outset and then proceeded to divide by the correct multiplier of 1.09. A few did recognise that 165680 was 109% but only divided by 109.

In summary

Based on their performance on this paper, students should

- carefully read questions
- practice questions involving significant figures
- provide solutions to problems in a systematic manner
- use a calculator for this paper.