Pearson Edexcel

Examiners' Report

Principal Examiner Feedback

November 2023

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 provided good coverage across the specification and allowed students the opportunity to demonstrate their ability across the grades. Plenty of success was seen across the early part of the paper as students showed confidence picking up marks in the first half of the paper.

Challenges arose when questions contained a context and with it large amounts of text; extracting the key pieces of information and applying it using the correct mathematical processes are an area for improvement. Good amounts of working out were seen which certainly helped students, especially those which had arithmetic errors as part of their solution.

Question 21 onwards proved challenging for this cohort with very few students gaining full marks and the mode score being 0 marks on almost all questions. Nevertheless, the majority of questions were at least attempted in a bid to gain some credit.

For those questions requiring a written conclusion, most responses did have some sort of decision showing that students are well-accustomed to this sort of demand in a question.

Areas of the specification that need to be improved upon are highlighted in the list at the end of this report.

REPORT ON INDIVIDUAL QUESTONS

Question 1

A good number of students were able to give a correct answer of 6 but there were a significant number who did not and a wide variety of incorrect answers were given. The most common incorrect answers were 4 (from finding the median) and 5 (from finding the mean).

Question 2

This question was answered well with the majority of students able to give a correct answer of 31. Of those that didn't gain B1, 209 was the most common incorrect answer from adding instead of subtracting; 41 was also seen when students were unable to deal with the tens correctly.

Question 3

This simplifying question saw mixed results. The majority of students were able to give a correct answer of $12a$ but there were a variety of incorrect answers seen. Students should note that this type of simplifying question requires no multiplication signs in the answer; $12 \times a$ and $3 \times 4a$ were often seen and gained no marks.

Question 4

Measuring angles is an area of the specification that needs attention. Although some students did gain a correct answer in range, with 40 most commonly seen, there were a whole range of incorrect answers given such as 35, 50 and 140.

Question 5

The majority of this cohort were able to gain B1 for a correct answer of 60. Of those that didn't, 50 and 150 were the most common incorrect answers seen.

Question 6

The majority of students gained 3 marks for an answer of 2300 on this question. For those that didn't it was an error in conversion which was often seen with 1 litre = 100 millilitres being the most common incorrect conversion used; these students could still gain 1 mark if they had a correct process to find the difference using one of the incorrect conversions stated in the mark scheme. Those students who converted 3 litres into millilitres were more successful than those who converted 700 ml into litres and errors in arithmetic were noted when doing 3000 – 700. A small number of students arrived at 2300 but spoiled their answer by then trying to convert to litres; this was still allowed if the student gave an answer of 2.3 litres but 2.3 on its own lost the A mark and this was seen on occasions. Some students also missed that the question was about 3 litres and instead subtracted 700 from 1 litre (1000 ml) obtained 300 ml and gained no marks.

Question 7

Part (a) was answered very well with the majority gaining B1 for an answer of 15. Some students found the difference between 1 and 5 and added this to 3. Part (b) saw less success with more incorrect answers seen than in (a), the most common being 10 from dividing 20 by 2 instead of 4. There were still a good proportion of the cohort who gained B1 for an answer of 4.

Question 8

Part (a) saw mixed results. A good number of students were able to find the correct frequencies for 2 marks. Many gave the correct frequencies in the tally column and something incorrect such as frequency/24 as a fraction which gained 1 mark. Some also confused the definitions of tally and frequency and put the information in the wrong column. It was encouraging to see that a number of students were crossing out items in the list as they entered their tally marks in the frequency table and were using the correct bar notation for recording the tallies. Part (b) was answered well with many gaining B1 for a correct answer; those that didn't often gave a number for their answer instead of the correct word. Part (c) saw the full range of marks awarded with most students gaining full marks. Of those that didn't, the most common error was an incorrect linear scale, although these students could still gain 2 marks for labelling bars and correct height bars for their scales and many did. Students often struggled to correctly scale the vertical axis, sometimes writing the numbers between the squares instead of on the gridline or using multiples of 3 or 5 which often led to errors.

Question 9

For part (i) and (ii) the majority of students answered the questions correctly to gain 2 marks. Of those that didn't, giving the answer in an incorrect notation, such as ratio, was often the issue; students should be reminded that correct notation for probabilities are fractions, decimals or percentages. Some students gave an answer of $\frac{8}{22}$ for (ii), e.g. the probability for 'pink' instead of 'not pink'. In (iii) the majority of students gained B1 for a correct answer with 0 and $\frac{0}{22}$ given in equal measure. Incorrect answers generally involved incorrect notation such as 0:22 or worded answers, e.g. impossible.

Question 10

It was pleasing to see the majority of students gain 3 marks on this question. The most common process seen was to divide 60 by 20 and then multiply 250 by 3 to arrive at 750. The majority of students who reached this point also gave a positive decision to gain the full 3 marks. Some students used a 'build-down' process starting at 900 and subtracting 250 three times to deduce there would be 150 grams left. Some students attempted to find the amount needed for one cookie and go from there but this process often led to arithmetic errors. Common incorrect processes often revolved around arithmetic errors and a small number of students reached an accurate figure to compare but gave an incorrect or no decision. Some students worked with the other ingredients too but this was ignored as long as it did not contradict their final answer. A number of students believed doubling and then doubling again went from 20 to 60 rather than 80 and therefore gained no credit.

Question 11

Less than half of students in this cohort were able to gain 2 marks for a correct enlargement. Of those that didn't, the main error was in the height of the triangle and the positioning of the top vertex; most were able to gain B1 for a base of 6 cm. Some students misread the scale factor and enlarged the shape by a different scale factor – usually 2 – if done correctly B1 could still be gained.

Question 12

Part (a)(i) was answered well with most students able to gain 2 marks for an answer of 26. Of those that didn't, it was common to see incorrect algebraic expressions such as $6g + 20h$ and 23 + 45 was often seen. Part (a)(ii) saw less success with many students unable to make any progress with the substitution. Many were unsure as to which letters should be substituted for which values and substituting g for 38 was often seen. For those that did manage to show a correct substitution, some were able to rearrange correctly to reach an answer of 13. One commonly seen incorrect answer was $g = 26$. Students should be advised to write the correct answer on the answer, on occasions 13 could be seen embedded in a calculation but the wrong answer given on the answer line, leading to 0 marks. Part (b) saw mixed results as less than half of students in this cohort gained 2 marks. Of those that didn't, many gained 1 mark, usually in one of two ways; successfully working out 3×-3 as -9 but being unable to accurately subtract 2 or for a full substitution; common incorrect answers included -7, 7 and 11. Some students wrote notes saying 2 negatives make a positive, leading to the misconception that the negative for the 9 and the subtraction sign meant the two values needed to be added, leading to an answer of 11.

Question 13

This question saw the full range of marks awarded. Some students were able to work through the process to reach an answer of 23p or £0.23. Of those that didn't, it was common to see 2 or 3 marks awarded, in particular for students who reached 160 or 460 but could go no further. Those that earned 3 marks gave a complete process with arithmetic errors in the process. It is encouraging to see that more students are fully demonstrating their method enabling them to gain marks despite their final answer being incorrect. Centres should continue to encourage their students to set out their working in a logical order so that they can access Method and Process marks. Some students dealt with the information and started the process incorrectly such as $100 \div 3$ or started correctly e.g. $100 \div 5$ but went wrong after that such as 20 + 8 and an answer of 28p. Some students incorrectly divided £3 by 5 following their process of dividing 100 by 5, resulting in an answer of 60p or 68p (after adding 8p) whereas others mixed up units within their working, e.g. 300/100 = 3g instead of 3p.

Question 14

This question saw the full range of marks awarded. Of those students who managed to plot the correct 5 points it was usual to see this accompanied by a straight line through the points. Some students gained 2 marks, usually for a line segment through 3 correct points; students should be able to recognise that an equation of the form $y = mx + c$ produces a straight line and therefore if one point is not in line with the others it will likely be incorrect. Some students gained 1 mark for producing 2 correct points either plotted or stated in the workspace but there were difficulties in calculating y when x was negative. More than half of the cohort gained 0 marks so this is an area of the specification that needs to be worked on.

Question 15

This question saw the full range of marks awarded. The majority of the cohort made a good start with a process to find 25% of 12,000. It was common to see students using the build-up method to work out percentages of amounts but this alone could not be credited with method or process marks if arithmetic errors were made and the process is not complete e.g. all steps seen such as 10% = 12,000 ÷ 10 = 1,200. Many then picked up the 2^{nd} process mark for subtracting the deposit from 12,000 and also the 3^{rd} for a complete process. It was common to see the accuracy mark not gained as students were unable to carry out the arithmetic for the division; 405 and 45 were commonly seen incorrect answers. Some students were not able to gain the first P mark but were able to gain the second and third P mark for a correct process using their deposit value and this was often seen. 12,000 was often misread as 1,200.

Question 16

Around two thirds of this cohort were able to gain 2 marks by reaching a value to show that Shah had passed the exam, usually 42 or 75(%). Some students had a correct method but could not carry it out accurately. Others were not able to gain any marks as they set up a fraction such as $\frac{45}{60}$ but were not able to go any further. Some students reached 42 or 75 but failed to interpret the results correctly, often saying that Shah did not pass the exam.

Question 17

The majority of students were able to gain at least 1 mark for correctly inverting the second fraction and multiplying. It was common to see the second mark gained too, usually for reaching $\frac{18}{5}$. Students who attempted to find a common denominator, e.g. $\frac{18}{30} \div \frac{5}{30}$ often made no further progress. The final step proved to be the most challenging for this cohort but some were able to successfully convert to a mixed number. Students should read the demand of the question carefully as 3.6 given as an answer was seen.

Question 18

The majority of students opted to use column multiplication for this arithmetic question. Some students managed correct place value in their structure and a good number of those managed to reach the digits 1512 to gain the first accuracy mark and place the decimal point correctly to the gain the full 3 marks. Common errors seen were incorrect place value in the columns, as well as incorrect arithmetic when adding the columns, usually arriving at the digits 378 or in trying to break down the components but only using 6 × 2 and 0.3 × 0.4, giving an answer of 13.2. Some students reached 1512 but were unable to place the decimal point in the correct place; centres need to continue to encourage students to use approximation to decide on a sensible place for their decimal point.

Question 19

It was rare to see a correct answer in (a)(i) with incorrect answers of 0 and 5 seen often. (a)(ii) also saw little success with the majority of students gaining B0; common incorrect answers included 0.05, −10 and −25. Part (b) saw mixed results, some students were able to make a correct first step, usually adding the powers for the numerator to reach 2^9. From there students either went onto gain 2 marks for a correct answer or incorrectly simplified, with $2^9 \div 2^3 = 2^3$ most commonly seen. A good proportion of the cohort gained no marks, making an incorrect first step such as $2^5 \times 2^4 = 4^9$ or $2^5 \times 2^4 = 2^{20}$. Some students also evaluated the terms as ordinary numbers and worked from there; if 64 was reached this gained M1 and was seen regularly.

Question 20

Part (a) saw most students make a good attempt at a factor tree. A good number of students were able to complete their factor tree accurately and also write their prime factors as a product. The factor tree was attempted by most students and well set out. There was a good understanding of the need for prime factors and very few included 1. Of those that did not gain 2 marks, common errors included incorrectly considering 39 as a prime number and arithmetic errors when considering the next pair of prime factors. For part (b) it was more common to see 1 mark gained rather than 2. Students were able to produce either the prime factors of 130, at least 4 factors of 156 or 130 or a common factor of 156 and 130. Of those students who gained no marks, finding the lowest common multiple was the most commonly seen incorrect method.

Question 21

Part (a) saw the full range of marks awarded. Some students completed a fully correct process to reach an answer of 3.5 or equivalent. Of those that didn't, some reached as far as 14 ÷ 4 but could not follow the process through with 3.2 quite often seen as the result of the division; students and centres should note that $\frac{14}{4}$ gained full marks. Some students were able to find the total length of the 5 sticks but made no further progress. There were also a good number who did not manage to make a correct first step and gained 0 marks; a common error was to calculate 4 × 7 or 4 × 4.2 rather than 5 × 4.2. Part (b) saw little success as most students gained no marks, with common incorrect responses centring around the mean increasing or the length of the other 4 sticks being reduced.

Question 22

It was rare to see a fully correct construction and 90° angle at *P* on this question. Almost all students on this paper did not know what arcs were required. Many students did however gain 1 mark for drawing a 90° angle at *P* without the correct construction lines.

Question 23

Very few students were able to gain full marks on this question. A small number made a positive start and gained one of the first two P marks, the equations most commonly seen were $x = 2y$, $2x + y = 180$ and $y + w = 180$. Division by 3, rather than 5, of the 180° in the triangle was commonly seen. Most students understood the correct angle facts for angles in a triangle / on a straight line. Many students ignored the fact the triangle was isosceles and calculated the angles as if it was an equilateral triangle, giving 60° angles which led to $180 - 60 = 120$ as the incorrect answer. Many students attempted to assign values to x and y, these values were usually incorrect but if the correct values were seen this usually led to a correct value for w as well.

Question 24

This was another challenging multi-step question for this cohort; the majority gained 0 marks. Some were able to make a correct start and set up an equation in x, although some failed to include the x from shelf **A**. Progress from there required a correct process to solve their equation and substitute the value for x into one of the expressions for shelves **B** or **C**, any students that did this successfully often gained the 3rd P mark as well for 7500 ÷ "25". It was rare to see any students get as far as the 4th P mark but those that did usually went on to gain full marks assuming their arithmetic had been correct. There were many completely incorrect solutions seen such as expanding $(3x + 1)(2x - 5)$ or setting $3x + 1$ equal to 7500 and going from there.

Question 25

Those that knew the density, mass, volume formula generally scored 2 marks. Of those that did not gain 2 marks, most scored 0 for incorrect use of mass and volume, with the most common error being to multiply 27 and 10 instead of divide. Other incorrect methods involved trying a volume unit conversion, confusing units^3 with 10^3 and dividing 27 by 1000, and being unable to choose between m/v and $m \times v$ and stating both.

Question 26

It was common to see students gain the first method mark for rounding one of the figures appropriately, 6 or 8 on the numerator being seen most often. The majority then struggled with the next step which was to carry out an accurate calculation. Some were able to reach the digits 16, from attempting 48 ÷ 0.3 but resulting in incorrect place value. Some students attempted to work out the accurate calculation and then round the answer, gaining no marks. A few students were able to deal with the decimal value of 0.3 in the denominator by multiplying both the top and bottom of their fraction by 10. This is a useful skill for centres to continue teaching their students but in general dividing by decimals is a skill that needs more practice. Some students rounded 0.26 down to 0 which led to 48 ÷ 0 and were confused with what to do with the calculation.

Question 27

For part (a) there were many good attempts to expand the brackets but these attempts rarely resulted in credit being awarded. Common errors included $6x$ or $5x$ instead of $6x^2$ and incorrect signs being used. Those students using the grid method to expand the quadratic were usually successful at gaining at least 1 mark. In part (b) a small number of students were able to give a correct factorisation. Some students who gained B0 were able to give a pair of brackets with the product of the constants being −16, such as $(x + 2)(x – 8)$.

Summary

Based on the performance on this paper, students/centres should work on:

- measuring angles accurately.
- improving numeracy skills, including division skills for integers and decimals, multiplication skills for decimals.
- the interpretation of problems involving ratio.
- the formation of algebraic equations and solving them along with subsequent substitution to apply to problems in context.
- drawing a straight line graph by correctly calculating a table of values.
- using equilateral, isosceles and right-angled triangles to solve angle questions.
- encouraging students to show a full method for percentage calculation, noting that before method marks can be awarded a full explanation of each step has to be shown. If the answer is just stated then process marks will be lost if there are any arithmetic errors.
- encouraging students to set out their working using logical steps.
- encouraging students to read the question carefully so that they understand what they are required to do and what format the answer should be stated in.
- encouraging students to use approximations to check if their answers are sensible.
- encouraging students to set their work out in an orderly fashion.
- improving the expertise and accuracy required in geometric constructions.

and

- in questions requiring finding the prime factors of a number, encourage a more structured approach of dividing the number by the smallest prime numbers successively until the result was a prime number.
- ensure students know common metric equivalents from the specification, from one unit to another.
- practise arithmetic processes involving negative numbers.

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