Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

Summer 2023

Pearson Edexcel International GCSE
In Mathematics A (4MA1) Paper 2FR

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Principal Examiner's report

Students who were well prepared for this paper were able to make a good attempt at all questions. It was encouraging to see many students clearly showing their working. Drawing congruent shapes, converting currency, adding fractions and percentages were some topics that some students found challenging.

On the whole, working was shown and was easy to follow through. There were some instances where students failed to read the question properly. For example, in Q10, some students did not answer the question but simply worked out 96 or 4416.

A striking weakness in students was solving problems with scale drawings, ratio, applying simple trigonometry and working out problems involving the combined mean. On the whole, problem solving questions and questions assessing mathematical reasoning were not tackled well, this was particularly apparent in questions 7, 10, 14, 15b and 24

Comments on individual questions

Question 1

This question was answered well by almost all students.

On part (b)(i) some students wrote down square instead of cube and on (b)(ii) some wrote down product rather than factor.

Question 2

This question on shape and measure had a good response for parts (a) and (d) with mostly correct answers. However, some got edges and vertices of a shape mixed up for (a) and some gave an answer of 220 for the weight marked on the scale for part (d). Part (b) was less well answered with many students not knowing the meaning of the word congruent. Part (c) also had a mixed response with some students thinking that a parallelogram has order of rotational symmetry of 1 rather than 2

Question 3

Most students were able to identify the planet with the lowest mean daytime temperature in part (a) but were unable to find the difference between two temperatures in part (b)

Question 4

Most students were able to write the correct coordinates for both parts in (a). A common error was to write the coordinates the wrong way around. In part (b), most of the students plotted the point correctly and showed a correct drawing of a rectangle. A few plotted crosses in various places on the grid and often did not join up to see if the shape looked correct. A suggestion would be, if a certain shape is to be made, join the points and make sure it does look like the shape required.

Question 5

All parts of this question were generally answered well. In part (a), the correct answer was generally given but examiners saw all the other fractions given as the answer in equal measure. In part (b), some incorrect combinations of fractions given.

Question 6

Part (a) rarely saw incorrect answers given by the students. In part (b), it was encouraging to see many students obtain the correct height of the bar and correctly complete the bar chart. Some students misinterpreted the height of the bar for the white cars as 10.5. The student could still gain the first mark for one incorrect reading but lost the mark for the first accuracy mark. Students who made one error in their reading of the white cars still could gain the final accuracy mark for following through their value for the height of the bar for the black cars.

Question 7

Many students found this question challenging. Most of the students gained one mark for simply multiplying 1620 by 0.9 to obtain 1458. A common approach was to multiply 1620 by 0.9 and by 1.08 and then subtract to find the final answer. The students only gained one mark using this method.

Many students had no concept that 1620 must be divided by 1.08 to find the number of euros in Munich.

Question 8

This question was a good discriminator with part (a) being well done by most students and part (b) providing more of a challenge. Most of the students were successful in gaining both marks in part (a) and only a minority of students gained all 3 marks in part (b).

In the second part some students failed to realise that the question was testing inverse operations and substituted 220 for the number of hours worked. Other students were able to identify the inverse operations needed but applied them in the wrong order. Many students used a trial and improvement method. Some students subtracted 65 from 220 and then divided by 25 resulting in an incorrect method and answer.

Sometimes students could have avoided a loss of marks by checking that they had put the correct number on the answer line by using the rule set up in the question. Students should show all the intermediate steps.

Question 9

(a) Many students did not realise that triangle *DCB* was an equilateral triangle even though the equal sides were shown in the diagram and stated under the diagram. There were many incorrect answers.

(b) Many students worked out the correct answer of 58° by identifying that the sum of the angles should come to 180°. However, a majority of students lost marks by not giving a correct reason. Students should learn the correct wording of the reason: i.e. angles in a triangle add up to 180°.

Question 10

Whilst many correct answers were seen, some students were unable to successfully navigate their way through this problem. The majority of the students gained some marks by working out $\frac{4}{5}$ of 120 (= 96) to find the number of packs of cherries and then going on to multiply 96 by 46 to obtain 4416. After this stage, many students did not know what to do. Many students did not find 3360 (120 × 28) and then did not subtract this value from 4416 to find the final answer of 1056.

Question 11

The two-way table was very well answered, and many candidates gained full marks. There were only a minority of students who did not gain any marks.

Question 12

Many students found this question challenging.

(a) Very few students gave the actual distance between *A* and *B*. Surprising, some students made errors in measuring the distance, some errors suggesting students did not have a ruler. Some students measured the line *AB* but did not multiply the value found by 3 thus losing all the marks.

(b) Many students gained no marks for this part of the question. Some students were awarded one mark for the calculation 24 ÷ 3 or for 8. This clearly is a topic that students find difficult at this level. Even when knowledge of bearings was apparent, accuracy in the use of a protractor was often poor (or missing). Many took the bearing from *A* rather than *B*.

Question 13

This was poorly answered by some where they tended to find 49% of 175 rather than 49 as a percentage of 175. Those that knew what was required were generally able to give the correct answer of 28

Question 14

A minority of students at this level were able to gain full marks on this question. Most students either gained full marks or no marks. It was common for the students to carry out the following calculations: 135 ÷ 2 or 135 ÷ 7 leading to no marks in the question.

As usual, there was a significant amount of often convoluted working that made little sense mathematically.

There was evidence that some students did not read through the question carefully enough.

Question 15

(a) Many students realised that each member was represented by 6° (72 ÷ 12) but then failed to realise that they needed to divide 138 by the 6° that represented each member. Some students tried to use a two stage approach by expressing $\frac{12}{72}$ as $\frac{1}{6}$, however, they never completed the second stage and gained no marks.

(b) Only the most able students could answer this part of the question. A majority of the students could not find the equation $18 + 2x + x = 90$. Students' algebraic skills at this level were very poor. Some students took an arithmetical approach by subtracting 18 from 90 finding 72 to gain the first method mark. At this stage a common error was to divide 72 by 2 and then writing an incorrect probability of $\frac{36}{90}$. Some students did realise that 72 should be divided by 3 and found 24 but did not write the final answer thus losing the final accuracy mark. Only the most able students gained full marks.

Question 16

(a) Some students were successful by factorising correctly, but it is clear that this cohort need to work on factorising; it was usual to see incorrect answers such as $6(y - 27)$ and $\pm 21y$ as offered as the correct answer.

(b) Correct and incorrect responses were seen in about equal measure, with the most common wrong answers not unexpectedly being $p^2 - 2$ and $2p^2$

(c) It was encouraging to see some students were able to achieve full marks, with a good number of the rest able to gain one mark for correct substitution. A common error was to rearrange the equation incorrectly by writing down $85 - 46 = 4r$. Students who rearranged correctly went on to gain full marks, but some forgot to divide −39 by 4. Numerical methods were rarely seen. Some substituted 46 as the value of 'g' instead of T.

(d) It has to be said that there was a great deal of sloppiness in students' notation when making the substitution and most students failed to write the −5 in brackets. They very often wrote $-5^2 - 4(3)$ or $-5^2 - 12$, with most of these students then going on to use their calculators with little understanding of how to deal with the square of –5. This resulted in many answers of −37 instead of the correct answer of 13. Students are advised to put brackets round any negative numbers when working with algebraic expressions involving substitution both when writing down their working and when inputting any expression into their calculator

(e) Students who understand the technique needed to expand two brackets usually gained at least one mark. For these students, errors in associating the correct sign with the correct term or failing to simplify $5x - 7x$ correctly were the main source of errors. There were a significant number of students who failed to gain any marks; it was not uncommon to see just two terms given as an answer, frequently $x^2 + 2$ or $x^2 - 2$.

Question 17

Many students found this question challenging. A minority of students gained full marks and most students could gain one mark. This was generally for finding a multiple of 36. Some students divided their multiple of 36 by 9 and 12 respectively to find the number of packets of pens and the number of boxes of pencils required. Those students who listed multiples and then used 72 or 108 rather than 36 were able to access some of the marks. These students went on to multiply the number of packets of pens by 7.60 and the number of boxes of pencils by 4.80 thus gaining the correct answer of 44.80. Some students did not find the correct combination of the number of packets of pens and the number of boxes of pencils. A common error was to find 36 and then write down 7.60×36 and 4.80×36. In this case, only 1 mark was awarded as the students did not find the correct combination of number of packets of pens and the number of boxes of pencils.

Weaker students embarked on methods to find the individual cost of a pen and/or pencil which ultimately led to no marks.

Question 18

Changing a time given in hours and minutes to a time in hours continues to be a concept that is challenging for students at this tier. Thus, 3 hours 18 minutes was more often seen as 3.18 hours than the correct 3.3 hours. Where students used the correct method with 3.18 hours to work out a speed, they were credited with 1 mark, while students who used 3.3 hours could virtually always go on to find the correct speed, for the award of 3 marks. Changing the time to 198 minutes for one mark was a more successful first step for a high number of students but the majority of these could not score the second mark for distance divided by time as they failed to realise that they needed to multiply by 60 as well as divide by 198.

Question 19

This question was not done well. A minority of students could find the nth term of the arithmetic sequence, though $\pm 7n$ often featured in many attempts. Many other students obtained one mark out of two for identifying the common difference and including the term $-7n$ in their final expression. Common incorrect answers here included $n - 7$, $7n + 38$ and $7n$.

Question 20

A minority of students appeared to have knowledge of the trapezium formula (it is given on page 2 of the question paper) and were able to apply it successfully, although there were a number who neglected to put brackets round $(170 + 330)$. If these were not recovered at a later stage in working, no marks were awarded. Students who did not use a two dimensional formula to find the area were penalised and gained no further marks. Students who worked out 60 000 then divided by 10 000 to find the number of hectares, generally, went on to find the correct answer. Some students multiplied 49 650 by 6 thus losing the final two marks. Students who used a two dimensional formula to work out the area could access the second and third method marks.

Question 21

(a) Only a minority of students gained full marks on this question. Most of the students worked out the total pay for the new job and then subtracted 400 from 490 to find the difference of 90. Using the values of 90 and 400, the students went on to find the correct answer of 22.5%.

Some common errors were to write $\frac{400}{490}$ or $\frac{90}{490}$ thus leading to an incorrect answer.

(b) This part was a 'reverse percentage' question, but this was not how the large majority of the students interpreted it. By far the most commonly seen, but incorrect, method was to find 6% of the new amount or to increase the new amount by 6% Where students understood the question, they were nearly always able to show the working required and give the correct answer for all 3 marks.

Question 22

(a) Many students fail to realise that $a^0 = 1$. This question was poorly attempted which is to be expected at the top end of a foundation paper. Common incorrect answers were $16x$ or 16 or $4x$.

(b) This part was answered well. Many students giving an answer of –6. Some students wrote their final answer as 3^{-6} which was condoned.

Question 23

(a) As we expected, only the most able students sitting this paper were able to gain full marks on this question. Many students could collect the x term on one side and the numbers on the other side. There were a number of students who calculated the incorrect inequality of $x > -2$ rather than $x < -2$; these students were able to gain the method mark for the correct intermediate step seen ($-4x > 17 - 9$). However, they did not realise the inequality sign flipped when dividing by a negative number thus losing the final mark.

(b) There was evidence of x and y being confused in answers to this question. Similarly, the wrong inequality signs were often seen with = used instead of the correct $\geq$ and vice versa. In particular, students could not use pairs of inequality signs, so attempts such as $2 < y < 6$ or $2 < x < 6$ were seen. Incorrect values were occasionally read from the axes with -6 being used in place of 6 when writing down the inequalities in x being the most common of this type of error. For those that failed to score at all, the most common incorrect answer seen was just a list of coordinates with a complete failure to engage with the concept of boundary lines.

Question 24

A minority of students could use trigonometry to find the length of side *BC* or *CD*. A common approach to find the other side once *BC* or *CD* was found was to use Pythagoras theorem. A few students gained 3 marks for working out 42.4… and 26.4… Some students could not work out the radius of the cylinder. A common error was to divide 42.4… by 2 rather than 2π thus losing the fourth method mark and not gaining any more marks. Some students divided 26.4… by 2 or 2π thus losing the final 3 marks.

Question 25

As expected, only the most able students could answer this question. A minority of students did appreciate that they were being asked to calculate a weighted, or combined, mean for number of kilometres for Sunday. The most successful method was for finding the product of the mean and the frequency in each case and subtracting these two answers to obtain 369 and further subtracting 132 to obtain 237. A majority of the students struggled to find the number of kilometres for Sunday with some doing 104 ÷ 5 and 127 ÷ 7 which scored no marks.
There were many blank responses.

Summary

Based on their performance in this paper, students should:

- learn angles in a triangle add up to 180°
- use a ruler to measure the distance between two points
- learn to carry out calculations involving currency conversions
- learn when and how to apply simple trigonometry
- show clear working when answering problem solving questions
- read the question carefully and review their answer to ensure that the question set is the one that has been answered
- make sure that their working is to a sufficient degree of accuracy that does not affect the required accuracy of the answer.

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