Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

November 2020

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 answered by all students but there were a good number of fully correct answers seen for all questions.

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 may be withheld if answers only are shown.

It is important that centres consider the standard of student's handwriting. Markers will always try very hard to read the words students use BUT in this session some response were exceedingly difficult to read.

Reports on Individual Questions

Question 1

The opening question on the paper was well answered and most could express the number in an appropriate manner.

Question 2

This question was not so well answered as question one. 30 000 and 29 400 were given as popular incorrect answers.

Question 3

Many correct answers were seen. The majority of students gave the correct answer but the common incorrect answer was 7e suggesting that students did not process the – e given in the expression.

Question 4

This simple conversion from a fraction to a percentage was well answered and the vast majority of answers were correct. However, the common misconception that $\frac{1}{4} \equiv 40\%$ was seen several times.

Question 5

This question was not as well answered as the previous four questions. Students gave 9 as a popular incorrect answer and some gave more than one answer and hence even if 27 was one of the answers they could not have the mark as two answers meant that a choice was seen.

Question 6

It was very pleasing to see that students were able to answer this early problem solving question involving calculating with time well. Many students were awarded full marks for using the common method of converting to hours and minutes, a full method of addition to the start time and giving a correct conclusion. A range of alternative methods were also used successfully, such as finding the time duration between the film ending and the bus leaving to be able to compare to the 20 minutes walking time needed.

When full marks were not awarded partial marks were often awarded for a correct conversion of 105 minutes into hours and minutes or showing the intention to add both 105 minutes and 20 minutes walking time, with many showing both stages but losing the final mark for loss of accuracy or for not stating a conclusion.

When only one mark was awarded, it was often due to not converting to hours and minutes correctly and assuming 105 minutes represented 1 hour and 5 minutes or 1 hour 50 minutes. The other main reason one mark was awarded was when students did a fully accurate conversion and addition but did not include any consideration of the additional 20 minutes walking time.

Question 7

Students were required to critically evaluate the presentation of information in a graph in this question, with nearly all gaining at least one mark, and a great many students being awarded both of the marks available. Most students correctly identified that the scale was presented incorrectly, that there was a missing label or that the width of Tom's bar was different. Marks were often lost for statements such as there being a missing key or title or for comments relating to the gaps between each bar, with some also stating that the bars should be joined.

Incomplete or ambiguous statements, such as the scale needed to go up in tens or that it shouldn't start at zero, also led to the loss of marks, as did any statements containing a contradiction such as the scale started at 70.

Question 8

Part (a)(i) was generally well answered with the vast majority of students gaining the mark. Unfortunately, the main error was that some students actually measured the angle and so lost the mark.

Part (a)(ii) was not so well answered with many students failing to give the correct reason. A list of the requirements for reasoning marks to be awarded has been communicated to centres. Students need to give an accurate statement which is not contradicted. In this particular case 'a straight line is 180' was seen but did not gain the mark as the 'angles' was omitted from the reason.

The vast majority of students gave a correct answer for part (b) of this question. Many were able to correctly compare the fact of 360 degrees around a point with the total of 370 degrees given in the incorrect diagram shown. Some did this by comparing 270° and 280° others compared 90° with 80°, all correct comparisons were acceptable.

Question 9

Students generally did well on the first two parts of the question but fewer achieved the mark for part (c).

In part (a) the vast majority gave an answer of 25 with a few gaining the mark for 24. Some obtained an answer of 24 by using the formula, this could not score the mark for part(a) as it used an incorrect method.

In part (b) the vast majority of students answered correctly with only a few multiplying by 10 instead of dividing. Pupils should be reminded to read questions correctly and double check their answers. A few students used 25 instead of 40 in the formula and this misconception did not score any marks.

Part (c) was answered less well. The most common correct response was saying ‘difference of 1’ or a ‘difference of 1 mile’ both gained the mark. Those who didn't achieve the mark either described the process they used (looking at scale and using a formula) or simply restated their answers without a comparison. Students should practice comparing values and methods to help with this style of question. A significant proportion of students compared the accuracy of each answer and almost always believed a formula to be more accurate than reading the scale. As this formula was stated to be an approximation this was considered to be an unacceptable comparison.

Question 10

Part(a) was very well answered with very few errors seen.

Part(b) was also well answered, although a few more errors were seen here than in part(a). The common error was to see 10 and not 4 as the final answer.

Question 11

Although many good responses were seen for this question, a significant number of students did not score full marks. The majority of students who could successfully find the volume of the cuboid still lost the final mark for not including units with their answers. A large proportion of students did not know how to calculate the volume of a cuboid. Several incorrect approaches were seen. Some students went through a process of finding the surface area or the total length of all the edges. A lot of responses correctly gave $4 \times 15 \times 10$ as an initial starting point but then went on to complete an extra step either by dividing by 2 or 3. Irrespective of whether this was seen as one calculation or two calculations the full method seen was marked and only a fully correct method gained the method mark.

Some students with incorrect answers did give the correct units and thus scored one mark.

Question 12

This question was not as well answered as anticipated. Students often included numbers other than the two prime numbers, 23 and 29, in their responses. The popular incorrect values being either 21, 25 or 27. A few students failed to understand the idea of a code and just gave the two prime numbers. This gained a mark. Some students failed to give the code in the required form of ‘a letter followed by a number’. A few students listed all the numbers between 20 and 30 and so gave far too many combinations. Students are encouraged to read questions carefully and note the mark tariff for a question as this will give an indication of the amount of work required per question

Question 13

Many correct answers of 19 sweets were seen. However, a good proportion of students were successful only in determining the number of bags by showing 4275 divided by 28, for the first process mark and this was the only mark they gained. Some students went on to find the remainder and then gave 6 as the final answer. Some students found the fully correct answer and stated 19 sweets left but wrote 152 or 28 on the answer line. Centres should remind students to check their final answer does in fact answer the question asked.

Some build up methods were seen for this question but they were often left incomplete and so usually only scored part marks.

Question 14

Working out the angles in a pie chart and drawing the pie chart remain challenging skills for many students. This question was not well answered with a large proportion of students failing to gain any marks at all. A lack of working hindered students from scoring any of the available marks, it was possible to score two marks by converting the frequencies given into angles. It was also possible to score two marks by drawing one correct angle on the pie chart. Many students totalled the number of goals but then failed to associate 120 with 360 and were unable to calculate correct angles. Those who calculated the appropriate angles did not always manage to draw the pie chart accurately or failed to label the sectors appropriately.

More practice drawing pie charts does seem to be required.

Question 15

In part (a) only a few students scored one mark, most students either scored either no marks or two marks. The majority of students did score both marks but the main issue by far was incorrectly substituting in positive 7 instead of negative 7. Of those that successfully gained the first mark, some then did not subtract, but added 15 and 28 to get an answer of 43 even though they wrote 15 + – 28

Part (b) was not so well answered as part (a) although almost 40% of students scored full marks. Those that didn't gain full marks often received the first mark for substituting or for 38 – 18 = 20 but then didn't know to then divide by 4. A number of students could not substitute correctly into the equation and some students were not able to interpret 3x and $x = 6$ as meaning 3×6, with 36 seen here. Incomplete processing often led to only one mark being awarded.

Question 16

The modal score for this question was four marks. The question required students to work with a fraction of an amount and a percentage of a different amount within a mini problem. When full marks were not awarded students often gained part marks for finding 70% of 60 as 42 or for finding two thirds of the total marks available or two thirds of the marks available on an individual paper. Whether the student went on to score full marks hinged on the need to consider the total pass mark needed was 100 and then perform the required subtraction.

A common loss of marks was often due to the misconception that two thirds is equivalent to 60% or 0.6, but this secured the award of two marks as a special case if all stages were carried out accurately. Students should be able to calculate with thirds as fractions and not try to approximate to decimals or percentages as this all too often leads to inaccurate answers.

The use of a build-up method to calculate the percentage was commonly seen but was not always successful. Students must show a correct process for finding a percentage of an amount to avoid the loss of marks.

This problem was very accessible to students and often working was clearly shown.

Question 17

In part (a) many students tackled this proportionality question very well, showing full working to support a correct decision and gaining full credit. A range of approaches were seen, with the most commonly seen being to calculate the number of oranges required to make 8 litres and either dividing this by the number of oranges in a box or calculating with multiples of 24 until 120 was reached.

Of the students that attempted to work with the number of boxes needed for each 2 litres and working with the number of oranges left over, a full method that was not confused was rarely seen, but often one mark was awarded for a suitable start to the method.

Some students confused the use of the 30 and 24 and wrote 6 oranges left rather than 6 oranges still required and this inevitable led to confused and incorrect working.

Another common error was to not engage with the fact that 30 oranges were required for 2 litres, thinking that 30 oranges made 1 litre and to multiply by 8 at the start rather than 4, then successfully divide by 24 leading to an answer of 10. In this instance the special case was applied.

In part (b) the majority of students demonstrated confidence and understanding of the requirement in this question to express the quantities as a ratio, with many beginning with 1260:280 and attempting to simplify in stages to a variety of different end points. This gained the method mark available, with many continuing further to a fully correct ratio in its simplest form.

However, when no marks were awarded it was often due to a lack of any ratio being written or clearly communicated. Some answers were given as a fraction which unfortunately gained no credit as the question clearly asked for a ratio.

Students should be encouraged to check they have answered the question asked.

Question 18

Describing transformations is a skill often tested but even so this question was not well answered.
Many students recognised that a rotation could be used but then failed to mention 180 degrees or the centre (-1, 0). The enlargement option was very rarely seen.

Common errors seen were using more than one transformation to describe what was happening or the use of incorrect terminology like “moved”, “turned” “spin” and even “flip” which resulted in loss of marks.
One mark was awarded for rotation with either of the other two features; quoting (-1,0) seemed to pose most difficulties as when seen incorrectly, it was often given in the reverse order of (0,-1).

Question 19

This question appeared challenging for some students to interpret the necessary information. Many just rewrote the question rather than use algebraic notation e.g. L is a half of Adam rather than $L = ½ A$. If they then put $L = 3R$, a process mark was available for good algebra.

However the more successful method was to choose a convenient number for the lowest amount (R) and work out what the others would have, often resulting in 1:3:6, although simplest form was not required and 10, 30 60 assigned was also seen often. Students with these figures were usually able to give the required fraction. Although a few still struggled with adding 1, 3 and 6 and often 9 was seen as the incorrect total.

Question 20

Over half of the students were able to gain marks on this question. Although many did not fully answer the question the majority were able to find the cost of one pencil. Some did go on to begin to work with the ratio and this was required to progress to the level required for marks to be awarded.

A common error was to find the cost of one pencil and then multiply by 3 instead of division by 3 thus using the ratio incorrectly. Students who found the cost of one pen using a correct method then usually went on to find the accurate answer of £1.75

Question 21

The use of a factor tree was the most common method used in this question for both parts.
Some students included a factor of 1 which was condoned in the factor tree but not in the final answer. Too many students had a correct factor tree but then lost a mark by failing to represent the answer correctly. They often just wrote 2,2,3,7 or 2+2+3+7 on the answer line instead of 2×2×3×7. The most common error seen in part (a) was to leave 21 as a final part of the factor tree and consider this as a prime number. As 21 is only 3 × 7 this was a surprising common misconception.

In part (b) a common mistake was to consider factors instead of multiples. Several students drew the factor tree for 60 correctly but then did not know how to use the prime factors of the two numbers to find the LCM. The use of the same factor tree in part (a) and part (b) was allowed as follow through if the same error was repeated. The most successful way of answering this question was when students listed the multiples of the two numbers and correctly selected the lowest common number in the list.

Question 22

In part (a) the principles underlying Venn diagrams seemed to be well understood, with the vast majority of students able to place some elements in the correct regions, with the modal mark for this part of the question being two marks. The main errors seen were incorrectly placing "1" and forgetting to place 3, 7, 9 outside the intersecting circles.

In part (b) students were again quite successful, with a majority gaining at least one mark, usually for $x/10$ but x was often not 2 nor did it relate to their diagram. Many students seemed to show an understanding of what was meant by the intersection symbol and were thus able to gain at least one if not two marks for this part of the question.

Question 23

Attempts at this multi-stage problem varied greatly with mixed levels of success. A small number of students scored full marks on this question and of those that did, almost all showed the full method followed by calculating 30% of 290 to support their 'no' response. Calculation of 31% was rare but acceptable.

Partial marks were often awarded for using the ratio correctly with 3000 to find 600, with many then continuing correctly to find the total number of tins in large boxes and small boxes to gain the second process mark. Many students then found the next stages of the calculation challenging, with very few finding the number of each type of box that would be needed and even fewer continuing to work appropriately with percentage. It was common to see students who had found 1800 and 1200 to continue to calculate 30% of 3000 and making an incorrect comparison to 1200.

The most common incorrect approach seen was to divide 3000 by 6 or by 20 and show no other calculations.

Question 24

Many students scored at least one mark for completing the table, but the modal score for this part of the question was two marks. However, a substantial number of students did not substitute the numbers given correctly into the equation and either assumed it was linear and thus gave y values as 7, 6, 5, 4 and 3 or made an error with the first entry of the table, suggesting again an area for development for students is the use of negative numbers in algebraic expressions.

A large proportion of students achieved one mark for part (b) as they were able to plot at least four co-ordinates from their table assuming that they had initially gained a mark for getting at least two values correct. Many students did not attempt to draw a curve and of those that did, some joined the points with line segments rather than drawing a curve and attempts at lines of best fit were sometimes seen.

Question 25

Students found this question challenging. Some scripts were left blank and others knew to use trigonometry but didn't know which to use out of sine, cosine or tangent, even when all the ratios were given correctly. Of those students that achieved the method mark, many could not then rearrange correctly to give the final answer. A common error seen was to try to use Pythagoras' Theorem or to try to use sin(34×178) in their calculators.

Question 26

Students attempted to answer this question in a wide variety of ways, some were able to gain a mark for the correct substitution or for obtaining the new vectors of $\begin{pmatrix}6\\8\end{pmatrix}$ and $\begin{pmatrix}15\\-6\end{pmatrix}$ but working with negative numbers caused a lot of problems when trying to combine these vectors. Far too many students used addition rather than subtraction. Other students scored a mark by finding one value in the final vector correctly.

Question 27

This question combined the skills of using Pythagoras' Theorem and finding the area of a quarter circle and as such it was not well answered by foundation students. Some students realised that Pythagoras' Theorem had to be used but then often added the values squared rather than subtracting. Other students were able to indicate the intention to use the correct process to find the area of a quarter circle, these students were awarded a process mark. A very few students scored full marks on this question.

Question 28

The sum of the exterior angles being 360 degrees only seemed to be known by a relatively small number of students which was disappointing. Many students gave an answer of 5 with no working, possibly from the use of pentagon rather than polygon.

Those who evaluated 360 ÷ 15 gave the answer of 24 gained full marks. Unfortunately, too many students went on to spoil their method by adding an extra step such as 24 ÷ 2 = 12 and then even 12÷ 2 = 6 with a final answer of 6 given. Other incorrect methods seen included the use of 180 ÷ 15 =12 and 12 given as the answer.

Question 29

This single mark question was not well answered. The vast majority of students were unable to pick out the value of the gradient from this simple equation.

Summary

Based on their performance on this paper, students should

- read questions carefully
- practise answering questions involving negative numbers
- always attempt questions as part marks are available for suitable starting points.

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