Pearson

Examiners' Report
Principal Examiner Feedback

Summer 2018

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

The vast majority of students seemed to be entered at the appropriate level. Students were generally well prepared. However, many clearly missed having access to a calculator. Questions 8, 10, 21 and 22 in particular were littered with arithmetical errors; these were essentially division errors.

It was pleasing to see so many students able to communicate clearly when required. However, this wasn't the case in all responses as untidy working out and illegible handwriting sometimes made it difficult to understand the student's intention. It is still relatively common to see students offer solutions without any working out to support them.

Report on Individual Questions

Question 1

Very few incorrect answers were seen to this question although an answer of 6300 was a common error.

Question 2

Students had more success with ordering the integers in part (a) than in ordering the decimal numbers in part (b).

Question 3

The majority of students gave a correct fraction for 20%. The most common correct answers given were $\frac{20}{100}$, $\frac{2}{10}$ and $\frac{1}{5}$.

Question 4

The majority of students gave the correct answer to this question; $\frac{15}{60}$ and to a lesser extent $\frac{2}{8}$ were the most common incorrect choices.

Question 5

Most students identified the first even multiple of 7 as 14. Students failing to do this often correctly listed multiples of 7 and then chose 28.

Question 6

Both parts to this question were answered well although part (a) had a greater success rate than part (b). In part (a) 7*t* was the most common incorrect answer whilst in part (b), many students initially worked out 3*a* + 2*a* and then subtracted from 8*a* to give 3*a* as the most common error.

Question 7

Parts (a) and (b) were generally correctly answered although errors were more prevalent in part (b), 'C' and 'A' respectively being the most common errors.
In part (c), it was pleasing to see many students successfully gaining full marks for a clear and correct structured solution. It was enough to show $\frac{8}{12} = \frac{2}{3}$ without the need for any statement of 'proof'. Virtually all students gained at least one mark for determining that there were 6 green counters. Sight of 8/12 gained 2 marks for many students. Some students calculated 2/3 of 12 and showed the answer to be 8. Occasionally students did not seem to understand what was required for a 'show that' question of this nature.

Question 8

About 70% of students correctly carried out this simple calculation; it was disappointing to see so many unable to divide 54 by 3 correctly. Many students thought that halving 54 and then halving again to get 13.5 was the equivalent of dividing 54 by 3 to get the cost of 1 kg of meat. £27, £40.50 and £34 (from 54 ÷ 3 = 17 instead of 18) were the most common incorrect answers.

Question 9

Of the more sensible incorrect responses, 'diameter' or 'circumference' and 'chord' or 'circumference' were the most common incorrect answers for parts (a) and (b) respectively. Only a minority of students were able to correctly identify the tangent in part (b).

Question 10

Most students gained at least two marks in this question by following either process shown in the mark scheme. Failure to gain full marks was generally due to poor arithmetic skills. Some students were unable to divide by 4 (particularly 220), clearly missing their calculators. Many wrote 2140 / 4 but did not attempt to work this out. A few thought that the cost of the flight was per person and multiplied by 4 before adding and dividing.

Question 11

Both parts to this question were answered well although a number of students did not appear to know the difference between even and odd numbers. In part (a), the odd number factors did not have to be explicitly identified; it was acceptable to show them in a product or a list or a factor tree diagram, if it was clear to which even number they referred. In part (b), some students were confused and gave a list of odd numbers or again carried out factor decomposition of numbers, even and odd. These lists did sometimes contain correct responses but were not identified providing examiners with choice. Some students mistakenly carried the criteria for part (a) over to part (b) and listed factors. Some students misunderstood this question, and gave examples to show the statements were correct.

Question 12

In part (a), most students gained the credit for an answer of 100 although a range of 95 to 100 was acceptable. In part (b), many students simply used the upper values of 260, 340 and 440 thinking these gave the number of laptops sold in each year, and often incorrectly read the scale. Misinterpretation of the split bars on the bar chart was common. Many failed to gain both method marks by not showing their working. In order to credit work done using incorrect readings it was necessary know which part of the diagram they referred to; this wasn't always clear. In part (c), the great majority of students correctly identified 'tablets' as having the greatest increase in sales over the 3 years, but many failed to give a satisfactory reason. The aim of this part was for students to simply say something along the lines of, 'tablets had the least sales in 2015 and the greatest sales in 2017' evidenced by the size of the blocks. However, many got caught up in trying to quantify the increase and failed due to incorrect values quoted. Many discussed social reasons rather than using the graph. In part (d), very many students seemed to agree with Alex's assertion, although many did realise that there was insufficient information in the question to be able to make such a judgement.

Question 13

Very many students were able to score at least two and often three marks in this question. Some carelessly read the question as requiring just one length of 45 cm to be removed before working out the number of 40 cm pieces remaining. One mark could be gained for this if a correct process was complete. Any incorrect length for the remaining piece of wire after the removal of the 40 cm pieces was ignored. A few students did not engage with 45 at all and just removed 40 cm pieces; this gained no marks.

Question 14

Most students gained at least one mark here for a correct process to work with the $\frac{3}{4}$. However, many simply converted this to 75% claiming that this was the proportion saved by Harry. Many students found difficulty in dealing with the ratio 3 : 7 where $\frac{3}{7}$ was a common incorrect fraction when finding the savings for Isabel. Conversion to comparative percentages was the most common approach although many introduced a value for their salaries and worked with this. The value chosen was often not a sensible one and created issues when trying to calculate 28% of its value. Only a few students failed to answer the question with a final statement.

Question 15

The most common approach in finding the percentage of a quantity on a non-calculator paper is by a 'build up' method. Most students correctly quoted 10% of 160 as 16 but many were unable to correctly find 5%, some divided by 10 again and some found 1% and then made errors in multiplying by 5. When using a build up method it is important to show all working. This advice was often ignored and it was impossible to award the method mark.

Some students quoted $160 \times \frac{15}{100}$ to gain the method mark but were then unable to correctly cancel to find the correct answer. Some students attempted repeated halving finding 50% 25% and 12.5% which was unhelpful. A significant number of students correctly found 15% but then proceeded to subtract it from or add it to 160 which lost them the accuracy mark.

Question 16

In part (a), whilst the majority of students correctly substituted the given values into the formula, many made mistakes evaluating $+3\times-2$ and incorrect answers of ± 26 were common. Many students correctly substituted $x = 5$ but then wrote $+3 - 2$, working this out as $+1$ to give an incorrect answer of 21. Even when students correctly calculated 20 and -6, many then added incorrectly, stating -14 for example as their answer.

In part (b), $4e^2 + 8$ and $4e^2 + 2$ were the most common incorrect answers seen. Expansions of $5e + 8e$ were not uncommon. Each of these partially correct answers were awarded one mark. Some lost the final mark for trying to simplifying to one term.

Many students used trial and improvement methods to solve the equation in part (c) sometimes, but not always, successfully. After a correct first step leading to $3m - 12 = 21$, a common error was then to subtract 12 from 21 resulting in an answer of 3 ($9 \div 3$). Expanding the bracketed term again proved a challenge for many students and $3m - 4 = 21$ was seen often as was trying to add 4 to both sides as a first step. Fewer students' first step was to divide both sides of the equation by 3, but those that did usually gave the correct answer of 11. Students who attempted a flow diagram method to solve the equation were usually unsuccessful.

Question 17

The correct answer of 1 : 3 was given by about 40% of students; frequently with no method shown. The ratio 1 : 4 was the most common incorrect answer. This shows the common misunderstanding of the relationship between ratios and fractions. Some students were confused by the reference to *n* in the question and felt that their answer should contain an element of *n*. So answers of 1 : 3*n* and *n* : 3 were sometimes seen. Some students used a value for the number of chocolates in the box and worked out the value of the separate parts often not reducing to the form 1 : *n.*

Question 18

A great many students clearly did not understand or know the concept of union and intersection, although the majority were able to pick up one mark for correctly listing either set *A* or set B either numerically or in a Venn diagram and identifying it as such. Many students got the union and intersection the wrong way around.

In part (a), a common error was to simply relist the two sets thereby repeating the common elements of 15 and 25. There were several alternative acceptable answers to part (b) and those showing some understanding of intersection were usually successful.

Question 19

Converting the mixed numbers to improper fractions was the most common approach in part (a). This often lead to arithmetic errors where at least one of the fractions with a common denominator was incorrect. The more economical approach of dealing with the whole numbers separately and then writing the fractions with a common denominator usually got the correct answer. However, the most common error was to add the two whole numbers and then simply to add the numerators and denominators of the fractions to give an incorrect answer of $3\frac{2}{11}$.

In part (b), many students simply did not know how to divide by a fraction with just under 75% of students unable to gain any credit in this question. Of those that did, the greatest loss of marks was for not reading the question carefully enough and failing to give the answer as a **mixed** number in its **simplest** form; answers of $\frac{8}{5}$ and $1\frac{9}{15}$ were common. Many unsuccessful students were aware they needed to 'flip' but were unclear which fraction this referred to (sight of KFC on scripts was common). Conversion of the first fraction to an improper fraction as a first step was regularly missed out by students.

Question 20

Just over half of students found the demand of this question too great. Some students were able to correctly work with the ratio 8 : 5 resulting in 80 flats but could not correctly link this with the ratio 7 : 4 to find the number of houses; an incorrect answer of 70 was very common indeed. Some students used diagrams to help understand the question with some pleasing success. Very few students tried to convert the two ratios to a triple ratio and a ratio such as 14 : 8 : 5 was a rarity.

Question 21

This question was quite well attempted and the majority of students gained at least one and often two marks. By a variety of methods, a correct number of bags (20) was found. This was then usually multiplied by 65p to find the selling price of the sweets. Although many were able to correctly quote a £3 profit, fewer were then able to convert this to a percentage; 3% and 13% were common incorrect answers given. However, it was pleasing to see that some students got 30%, often by realising £1 was 10% so £3 would be 30%. The use of repeated addition/subtraction was commonplace in dividing 5000 by 250 but this approach often introduced many arithmetic errors. An alternative approach, frequently seen, was finding the profit on 1 bag or on 1kg and then multiplying up to 5kg. It was disappointing to see that some students did not know how many grams were in a kilogram.

Question 22

A great many students did not seem to understand the concept of estimating values to enable a simple calculation. Students need to be encouraged to estimate the numbers given in the question rather than part way through. Many students used inappropriate rounded values such as 4000 and many wasted a great amount of time trying to compute accurate results. It was very common to see 15.12 × 8 = 120.96 followed by repeated addition/subtraction in an attempt to divide into 3069.25 Although rounding to one significant figure was not essential in gaining full marks it certainly did ease the calculations. Many students did use correctly estimated values, but then could not perform the relevant multiplication and division correctly. In part (b), many students simply did not try to answer the question posed. Many said that Juan would get there faster or quicker instead of words relating to time; their statement may have been a correct one but did not answer the question.

Question 23

In part (a), the most common error was an isosceles triangle of base 6cm and height 5cm (instead of 4cm). Some students offered 3-D diagrams or nets, all such attempts gained no marks. In part (b), many students tried to work out the volume of the pyramid instead of the surface area. Forgetting to divide by 2 for the area of a triangle was common. Many students left their answer without units and so failed to score this independent mark.

Question 24

Only a very small minority of students made any sensible attempt at finding both coordinates of point C and a fully correct answer was rare. Many students were able to find the width (38 – 6) and height (36 – 7) of the diagram. Values of 32 and 29 were then halved to give an incorrect answer of (16, 14.5). Some students thought that C was the midpoint of AB and gave (22, 21.5) as their answer. This did gain 3 marks for the correct *x*-coordinate. Most students did not recognise that there were four identical squares and so never made any attempt to work out the length of each side. Other common errors were to add 6 on the *x* axis and 7 on the *y* axis, interpreting the first coordinates as the side lengths of the squares. A minority of students drew their own scales on the axes to find the values of *x* and *y*, usually with little success.

Question 25

This question was poorly answered simply because very many students were unable to substitute and deal with negative numbers. The positive values of *x* were often correctly substituted leading to 3 and sometimes 4 correctly plotted points. These were often accompanied by incorrect points on the 'negative' side of the diagram. A line of best fit was then a common attempt at the final graph. The most common wrong answer was a line with a positive gradient, negative values of *x* giving negative values of *y* and similarly on the positives.

Question 26

For the final question on this examination paper, this was answered quite well with about half of all students gaining at least one mark. The correct doubling of vector **a** was often seen although sometimes written as a fraction $\binom{\frac{10}{4}}{}$ occasionally, only the 5 was doubled. Answers of $\binom{-11}{11}$, $\binom{11}{11}$, $\binom{9}{9}$ and $\binom{4}{9}$ were the most common incorrect offerings.

Summary

Based on their performance on this paper, students should:

- practice arithmetic processes; particular short division and negative number arithmetic
- ensure that all working is shown in a logical, ordered fashion and can be easily read
- learn and be able to recall metric conversions, for example, 1 kg is 1000 g
- remember to divide by two when finding the area of a triangle, i.e. use ½ × base × height
- practice estimating values to calculations by first rounding given values
- consolidate work on ratio and the links between ratios and fractions

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