AQA
Realising potential

GCSE
Mathematics

8300/2F: Paper 2 (Calculator) Foundation

Report on the exam

November 2021

Contents

Summary

Overall performance compared to last year

Most students were able to access many of the questions and were rewarded for good use of mathematics shown at different levels of ability. However, the second half of the paper, especially some of the questions that were common to the Higher tier, proved very challenging for Foundation students. Build-up methods, which are not the most sensible approach on a calculator paper, were fairly frequently seen and were often inaccurate or incomplete.

Topics where students excelled

- Recognising factors
- Drawing a bar chart
- Proportion using the unitary method
- Multiples problem
- Money problem
- Angles in parallel lines

Topics where students struggled

- Factorising
- Bearings and scale
- Pythagoras theorem problem
- Rearranging an equation
- Describing a transformation
- Relative frequency
- Equation of a straight line

Multiple choice questions

Which questions did students find most accessible?

Question 1 was very well answered with students showing a good understanding of factors, although the common incorrect response was the multiple 64.

Question 3 was also well answered showing a good knowledge of equivalent fractions and decimals. Here the common incorrect response was $\frac{1}{5}$.

Which questions did students find least accessible?

Question 22 was very poorly answered with more students choosing the answer 16, just squaring the given value, than the correct answer.

Some chose 2 from the square root of the given value.

Common misunderstandings/distractors

The common incorrect response for Question 2 was $y = 3x$.

In Question 4, the common error was to give half of the perimeter, $s + w$.

Although Question 14 was quite well answered, a lot of students gave $\frac{3}{5}$, which is $\frac{\text{red}}{\text{blue}}$, as their answer.

The common incorrect response for Question 15 was It has 12 vertices.

In Question 24(b), the common incorrect response was It is 90°.

Individual questions

Question 5

This was very well answered and even students who made errors often gained credit for working out 100 or 40. A common error was $96a$ which was seen coming from both 100 – 4a and 100 – 4 4a was sometimes evaluated as 14 or 410 and a^2 was sometimes evaluated as 20.

Question 6

Part (a) responses were mostly correct however some students gave the answer in words or as a ratio. Some students gave the probabilities for mango and orange separately. Those who used decimals or percentages sometimes lost accuracy by truncating their answers.

In part (b), a lot of very good, neat bar charts were seen. Students did well with the bar labels and creating bars of equal width. The most common error was to omit the frequency label for the vertical axis. Omitting zero from the vertical axis scale often resulted in inaccurate labels in the middle of the squares, rather than on the grid lines. Occasionally, students used an inappropriate scale of 3 or 4 to 1 cm.

Question 7

This was very well answered with even weaker responses usually gaining credit for working out the cost of 1 cake. The common error was to add the cost of 1 cake to the given cost to get an answer of £12.53, the cost of 7 cakes. Despite this being a calculator paper, there were a number of arithmetic errors seen.

Question 8

This was not particularly well answered. The most common incorrect answer was 19 from adding the three dimensions. However, there were many other incorrect methods seen including $8 \times 5 + 6$ and $(6 \times 8 \times 5) \div 2$.

Question 9

Most students approached this by listing multiples of 9 or by finding one multiple of 9 and then adding or subtracting 54 It was relatively common to find a correct pair but then put the factors on the answer line. For example, 18 and 72 chosen but then the answer given as 2 and 8 Some gave 9 and 45 which have a sum of 54 There were a wide variety of correct answers seen but 54 and 108 seemed particularly popular.

Question 10

Many students gave a correct conversion factor, often 1.6, but it was common to see that approach followed by an incorrect calculation such as 11.2×1.6 with answer 17.92 Weaker responses attempted to use differences rather than multipliers to scale up and often gave the answer 8.2 from adding 3.2 to both values. Methods using build-up, as well as being less efficient, often missed the final part of the full conversion so reached 11 km rather than 11.2 km.

Question 11

Some students thought they needed to use at least one of each note in every shop. Some ignored the requirement to pay exactly in each shop and just worked out the minimum notes needed overall. Those who listed the notes usually showed one or two shops correctly and often three or four. Students who did not set out their working clearly often counted wrong when totalling their notes for the final answer. However, there were many fully correct responses.

Question 12

There were many good attempts at completing the frequency tree. Occasionally students worked out the 8 home losses correctly but then put the result in the home draws. Some thought that $\frac{2}{5}$. and $\frac{1}{10}$ meant they should put 2 in the home losses and 1 in the away wins, just using the numerators. Others converted to 0.4 and 0.1 and then used 4 and 1. Many students realised that the sets of answers should both add up to 20 so achieved credit on follow through.

Lots of students were able to use their frequency tree to follow through correctly in part (b), although some only calculated the total points for their home games or the total points for their wins. Weaker responses just added the given 6 and 3 so had an answer of 9 Some used 6 points for both wins and draws and there were some arithmetic slips seen.

Question 13

This question was very poorly answered and there was a high proportion of non-responses. Despite the question using the word 'fully', students who made any progress often only partially factorised, usually taking out the factor of 10 Many students simply attempted to combine the two expressions to give the answer $150x$. Some students attempted to take x out as a factor, for example $10x(5 + 10)$.

Question 16

Many students gave a fully correct response. The vast majority were able to correctly label at least one of the angles on the diagram or to work out 127 or 101 Some students made arithmetic errors but there were also misconceptions seen such as $(180 - 48) \div 2$ or $180 - 127 - 48$ Those who used the angles at a point method seemed to be less successful. Some appeared to guess or measure the angles.

Question 17

Most students were able to access the question and to work out 7.35 ÷ 3 (Harry's contribution) or 7.35 × 4 (Jess' original amount), but it was less common to see both used. Some simply worked out that Jess contributed £14.54 and gave that as their answer. Occasionally, students used two thirds instead of one third. Another common error was to work out 29.40 – 16.99 – 7.35 and not take into account the information about Harry using a third of his money. A small minority of students used 0.3 for a third instead of dividing by 3 and weaker students simply worked out 7.35 – 0.33 or 7.35 – 3.

Question 18

Some students just did numerical calculations with $21 + 3 - 10 = 14$ common. Some were able to indicate adding 3 to both sides but then made an error in the execution to end up with $10x = 21$ or $13x = 24$. Those who started by dividing by 10 usually did not divide all the terms and ignored the 3. Some started by subtracting 3 but were able to follow through correctly and divide their answer by 10.

Question 19

Most students realised that the efficient way to answer this question was to convert to decimals and many had one or both correct and often went on to choose the correct answer. Some only showed one decimal place which was insufficient to make a decision. Some students attempted further work subtracting from 0.5 but not always accurately. Fractions with common denominators were rarely seen. Those using percentages usually omitted the % symbols. Some divided the denominators by the numerators and made no progress.

Question 20

In part (a), the common errors were NE 4 diagonals or North 4 cm or East 4 cm, with NW 4 diagonals seen slightly less frequently. Students were asked to mark the point, so just a letter B with no indication of where the point was gained no credit. Another common misconception was 2 squares across and 2 squares up, assuming a distance of 4 cm travelled along the gridlines.

Part (b) was poorly answered with many answers relating to part (c) seen, for example 3000 or 3 Occasionally students just said North. Those who gave bearings often said 0° or 090°. There was a large proportion of blank responses.

In part (c), students mostly gave 3, the distance on the grid, or 3000, the actual distance in cm, or converted incorrectly and had 300 or 0.3 as their answer. There was a large proportion of blank responses.

Question 21

Some good solutions showing all the relevant working were seen. This question differentiated well so, even if students could not find their way through the whole problem, there were lots of opportunities for them to gain several marks through the different approaches. Many students were able to work out the £81 extra she had been paid. Some worked out that this equated to 7.5 hours of normal time but did not know how to progress. Those who used a build-up method for 25% often made errors, but students who calculated 25% accurately could often proceed to finding the 6 extra hours. Some students gave this as their final answer, rather than her total hours worked.

Question 23

Many students assigned 34 to the wrong variable or only got one or two of the correct values. Some students thought the sequence was arithmetic and going up by 17 each time so gave the answer 6, 40, 74 Some students subtracted the wrong way around to get $p = -11$ A few students thought that p was half of 23. Occasionally, students guessed a value for p, often 10, and attempted to follow through. There was a large proportion of blank responses.

Question 24(a)

This question was poorly answered. The majority of students did not recognise it as testing Pythagoras' theorem or trigonometry, so it was common to see $15 + 7 = 22$ or $90 - 15 - 7 = 68$ or $15 \times 7 \div 2 = 52.5$ or other similar calculations. Most students who used Pythagoras' theorem used the correct method and gave an accurate response, although some then truncated or rounded incorrectly. A very small number of students managed to find one of the angles using trigonometry but usually progressed no further.

Question 25

Very few correct answers were seen but a small number made the correct first step or rearranged with only one error. Many students simply interchanged h and g to get $h = 3g - 1$. Some students did not show all their working and just stated $h = \frac{g}{3} + 1$ There was a large proportion of blank responses.

Question 26

This was very poorly answered, and a particularly large number of blank responses were seen. Stating it was an enlargement was the most common way to access the question, but students often also mentioned a translation as well. Although some referred to 4 times bigger or occasionally divided by 4, very few realised the scale factor was a quarter and often gave a negative scale factor. Frequently, students described the transformation from triangle *ADE* to triangle *ABC*. A small number mentioned the centre of the enlargement was *A*. Many students described how the shape was changing and the points moving but did not use any formal vocabulary in their description with words such as reduction, decreasing or unenlargement seen.

Question 27

Poor or blank responses to this question were seen fairly frequently and often only had the calculation to divide 5000 by 160 shown. The common ways to start a more successful approach were to substitute in the formula or to work out the volume that could be filled in 60 seconds. All three methods in the scheme were seen but the first method was the most usual. There were errors in the substitution including cubing π or omitting it altogether. Some students were not sure how to deal with multiplying by $\frac{4}{3}$. A common error was to forget to take account of the 5000 cm^3 of air that was already in the ball.

Question 28

This question proved to differentiate well between students with no one row being completed more accurately than any other. Most students managed to get one or two rows correct. Few students used the working space to try values but those who did often scored better.

Question 29

In part (a), many students did not realise how to work out relative frequencies and just tried to spot a pattern in the given numbers or divided the totals by 100. Those who worked out the relative frequencies usually plotted them accurately with just the occasional slip using the scale, often the 0.24 A small minority did not join the points.

Very few knew what was required in part (b). Some students used the relative frequency for 150, but the common error was to sum all the cumulative totals of late trains, 166, and divide by 250 or 750 There were quite a few answers that were greater than 1 seen and lots of students left this part blank.

Question 30

This was very poorly answered with very many students not attempting the question and those who did showing misconceptions. It was common to see $5x + 40 = 45x$ or an attempt to 'solve' $5x + 40$ leading to $x = 8$. Some students were able to access the mark for expanding the brackets and a small number were able to deduce that $x = 28$ if the line was a diameter. However very few finished off their argument and some incorrectly found x two ways to be two different values so concluded no.

Question 31

With this being the last common question on the paper it was beyond the capability of many Foundation students. There was a very large proportion of non-attempts. A small number realised that the equation should be in the form $y = 6x + c$ but $y = 6x + 3$ or $y = 6x + 19$ were common. Very occasionally, students were able to find the value for c, but then did not know how to form the equation. Weaker students worked out $6 \times 3 + 19$ and gave the answer 37. Some gave answers such as $y = 3x + 6$ or $y = 3x + 19$.

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