AQA
Realising potential

GCSE
Mathematics

8300/3F: Paper 3 (Calculator) Foundation

Report on the exam

November 2020

Contents

Summary

Overall performance compared to last year

There was no evidence of time pressure with most students able to complete the whole paper. Some of the questions that were common with the Higher tier proved very challenging for students on this tier. However, students were able to access most of the questions and were rewarded for good use of mathematics shown at different levels of ability. Students did not always show working when instructed to do so. It was apparent at times that some students did not have access to or use a calculator or the necessary mathematical equipment.

Topics where students excelled:

- Calculations with number cards
- Money calculation
- Listing combinations
- Frequency tree
- Angles on a line
- Coins calculation problem
- Cheapest cost calculation

Topics where students struggled:

- Algebraic descriptions
- Drawing and interpreting a pie chart
- Plotting and interpreting a conversion graph
- Mean and probability from vertical line chart
- Writing a formula
- Limits of accuracy
- Loci
- Pythagoras' theorem
- Distance time graph
- Similar triangles
- Median problem from a frequency table
- Percentage decrease problem solving
- Expand and simplify
- Column vector addition

Multiple choice questions

Which questions did students find most accessible?

Questions 1, 2, 3 and 23 were answered well showing a good understanding of place value, percentage of a number, inequality statements and ratio equivalence of a word description of two variables.

Which questions did students find least accessible?

Questions 4, 15, 21, and 27 were less well answered.

D and B was a common incorrect answer for question 4, $n - 1$ and n^2 were common incorrect choices for question 15, $y = 2x + 5$ and $y = -5x + 2$ were common incorrect choices for question 21 and $x^2 - 1$ and $x^2 + 1$ were the most comment incorrect choices for question 27.

Individual questions

Question 5

Parts (a) and (b) were very well answered. In part (c) most students were able to give a correct response however some students did not use the given numbers of 8, 5 and 3.

Question 6

A familiar straightforward calculation involving money was very well answered. Some students confused 19 weeks with 19 days and continued incorrectly with an incorrect answer of 2 weeks and 5 days.

Question 7

A very poorly answered algebra description matching question. The most common incorrect answers were to match $6x = 24$ to an expression and $5x + 3$ to an equation.

Question 8

This question involving listing combinations and was very well answered by the very large majority of students.

Question 9

This question involved populating data in a frequency tree and proved to be a good discriminator. A good proportion of students gave fully correct responses, although it was common to see some students incorrectly answering the percentage calculation required for 80% of the men and some misread the question to calculate 30% of the women instead of the 30 women who did not finish the race.

Question 10

This question was not well answered with many students unable to correctly convert $1\frac{3}{4}$ km to 1.75 km or 1750 m and with some students unable to convert between kilometres and metres. A significant number of students did not show any conversions.

Question 11

This question was very well answered. Occasionally some students incorrectly used 360°or 160° instead of 180° as the total of the angle sum on a straight line.

Question 12

Parts (a) and (b) were both very poorly answered.

In part (a) the large majority were able to calculate the sum of the Red and Green sections as 120° but a common misconception was then to incorrectly divide 120 by 3 to show Green = 40° and Red = 80° on the pie chart. It was apparent that some students did not have mathematical equipment as after correctly calculating Green = 30° and Red = 90° the angles were incorrectly drawn on the pie chart, there were instances of unruled lines and also sectors were not correctly labelled.

In part (b) the most common misconception was to calculate 75% of 600. Some students had success with calculating $\frac{360}{600}$ or $\frac{360}{600}$ but were unable to proceed with the next stage of the calculation whilst others had a fully correct method but truncated $1.\dot{6}$ as 1.6 with an incorrect answer of 120.

Question 13

This question was well answered by the majority although some correctly showed 9.80 in working but wrote £9.8 using incorrect money notation on the answer line. Common incorrect answers were calculating the correct number of 50p coins but not the total value or attempting to use £2.80 to calculate the number of 50p coins. Most commonly students had success with a correct method using a calculator but where candidates attempted to build up to £2.80 this led to errors in their calculation.

Question 14

Part (a) was reasonably well answered and was a very good discriminator with the marks spread very evenly. The most common errors were to calculate values incorrectly where a calculator had not been used or to use two special offers to buy 4 adults and 4 child tickets with a total value of £240 with one too many adult tickets.

Part (b) was poorly answered with common misconceptions in calculating a quarter by dividing 48 or 240 by 3, using 15% or 40% for an equivalent of one quarter and dividing 48 or 240 by 0.25.

Question 16

All parts of this question were very poorly answered and a significantly high number of students did not attempt any of the question parts.

In part (a) some students were able to correctly calculate coordinates, but a common misconception was to start with (0,36) instead of (1,36) and some drew all 20 points correctly but with no straight line drawn through the points. Students who created and used table of values tended to have the most success.

Part (b) was very poorly answered with many students calculating a value rather than using their graph, the most common incorrect answer was 180 and some students achieved a correct answer of 13.8 but did not give their answer to the nearest whole number.

Part (c) was also very poorly answered with most students not appearing to use their graph or they did not have a graph to work from. Those students who had some success calculated 30 ÷ 1.61 = 18.6 or 30 × 3.6 = 108 without proceeding further. The most common misconception was to use the calculation 30 × 1.61 with an answer of 48.3.

Question 17

Part (a) was very poorly answered. Some students correctly calculated the products and totalled them to 69 but then incorrectly divided by 5 instead of 25. Common misconceptions were to add the frequencies to total 25 and then divide by 5 or to add the number of days to total 15 and then divide by 5.

Part (b) was poorly answered with a significant number of students correctly calculating 19 students absent for less than 4 days but did not recall that a probability should be written as a fraction, decimal or percentage and simply wrote 19 on the answer line or gave their answer incorrectly as a ratio.

Question 18

This question was very poorly answered with most students not able to understand the frequency table or deal with the £10 multiplied by x to achieve $10x$ in a formula.

Question 19

The majority of students were able to correctly identify one of the correct dimensions of the rectangle for the front elevation but many of those could not correctly identify both and so the question was not very well answered.

Question 20

Both parts (a) and (b) of this common question on bounds of accuracy were poorly answered. The most common incorrect answers in part (a) were 17 000, 18 000 and 1000 and in part (b) 18 500 was the most common misconception.

Question 22

This question was very poorly answered with a large number of non-attempts. A small proportion of students correctly drew an arc centred at *B* but were then unable to proceed further. A significant number of students did not appear to have compasses and attempted to draw freehand arcs.

Question 24

Most students did not realise that they needed to use Pythagoras' theorem to work out the hypotenuse length of the right-angled triangle. Many simply added 32 and 60 to achieve an answer of 92 cm, a common misconception was to incorrectly apply Pythagoras' theorem and subtract the squares of the sides to incorrectly achieve $\sqrt{2576}$ = 50.8 cm.

Question 25

The majority of students found this common question challenging at this tier and the question was very poorly answered. Many students correctly calculated 45 minutes for the second stage of the journey and some correctly calculated 6 miles for the length of the journey but very few were able to correctly calculate the speed for the final section of the journey. Of those students who

attempted to use the formula speed = distance ÷ time most were unable to adapt by rearranging the formula to aid them to answer correctly. Others could not convert 45 minutes to 0.75 hours and were unable to correctly calculate 6 ÷ 0.75. There were a significant number of non-attempts.

Question 26

This common question was very poorly answered, and few students realised they needed to calculate a scale factor to link the two similar triangles. Students either knew how to work with similar shapes or failed to gain any credit. A common incorrect answer was 20 – 12 = 8 cm. There were a significant number of non-attempts.

Question 28

Most students were unable to gain any credit on this question and there were many non-attempts. Some students were able to work out that a, b and c needed to add up to 11 but were unable to proceed further. Few students understood the significance of the median being equal to 3.5 and that the values on either side of the median would be 3 and 4 and hence that c = 5.

Question 29

This question was a good discriminator with the large majority of students gaining some credit. Some students worked with the semi-perimeter without stating this and were then comparing percentages by default. A common error was to use 15% or 10% on both the length and the width or to transpose the calculations and reduce both the length and the width by 6 cm.

Question 30

Most candidates attempted this question, however there were very few fully correct answers. The majority of students correctly expanded the first bracket as $8c + 12$ but were unable to expand the second bracket. The most common misconceptions were to expand –1 across the second bracket as $– 5c – 1$ or to multiply the second bracket by 4 to achieve $– 20c – 4$.

Question 31

This question was very poorly answered and there were a large number of non-attempts. The most common method for some students to gain credit was by correctly working out the 4**c** vector to show $\begin{pmatrix} 16 \\ 36 \end{pmatrix}$. The most common misconception was $\frac{16}{9} + \frac{6}{-5}$ to obtain an answer of $\begin{pmatrix} 26 \\ 45 \end{pmatrix}$

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