Questions matter

GCSE
Mathematics
8300/2F: Paper 2 (Calculator)

Report on the examination

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Summary

Overall performance compared to last year

There was no evidence of time pressure with most students able to complete the whole paper. Some students seemed to be unfamiliar with the names of some shapes and their properties. Some used non-calculator methods where use of a calculator was expected, and these sometimes led to inaccuracies. Students did not always show full working out where it was required, but they were rewarded for good use of Mathematics when it was shown.

Topics where students excelled

- Finding the next term in a sequence
- Working with money
- Solving simple linear equations
- Writing down coordinates
- Angles on a straight line
- Angles around a point
- Pictograms
- Finding the range from a set of values
- Finding the mean from a set of values

Topics where students struggled

- Stating a term-to-term rule for a sequence
- Working with time
- Pie charts
- Rates and straight line graphs
- Symmetry
- Map scales
- Trigonometry
- Relative frequency
- Reverse percentage
- Error interval

Individual questions

Question 1

The vast majority of the cohort were able to find the next terms in both parts (a) and (b).
In part (c) it was quite common for students to state the next term and give it as their answer or state that the rule was $2n$. Although many knew they had to multiply by two to get the next term from the previous term they did not appreciate that this was the 'term-to-term' rule.

Question 2

This was generally very well done, with the majority answering both parts correctly.
In part (b), those who found the cost of the soap and body cream and subtracted to find there was £1.70 left sometimes chose Yes rather than No, whereas those who found the total cost of all three items were more likely to choose correctly. It was quite common for students to find the cost of the soap and body cream as £5.80 and incorrectly think that they had sufficient information to decide.

Question 3

Parts (a) and (b) were generally very well answered.
In part (a) a small number knew that the value of x was 6 and wrote an embedded answer in the working space and followed it with 30 on the answer line.
In part (b) a common error was to subtract 2 from both sides and give the answer as 8
Part (c) was less well done than either of part (a) or part (b). The majority did know how to simplify the fraction and gained credit for a partial correct simplification, but then did not give the answer 5. Common errors were to write $\frac{10}{2} = \frac{5}{2}$, or to give a final answer of $\frac{5w}{1w}$, or $5w$

Question 4

Most students knew how to write the coordinates correctly. The coordinates of point C were seen occasionally as (-2, 2) was instead of (2, -2). The coordinates of the midpoint of AC were sometimes given as (2, 0) instead of (2, 1).
Part (c) was not completed with as much success as parts (a) and (b). Those who knew what a rhombus was often gave the coordinates as (5, 1), but there was a large number of students who did not know what a rhombus was.

Question 5

Both parts of this question were well done with approximately 80% gaining full marks.
Some gave the mean as the answer to part (a) and the range as their answer to part (b). A common error in part (b) was to add the five numbers but stop at the total.

Question 6

Parts (a) and (b) were completed accurately by the vast majority. In part (b) a few added the two angles and didn't subtract and a small number that did subtract subtracted from 380 or 400.

In part (c) approximately a quarter of the cohort were able to provide working that correctly led them to conclude that the triangle was an isosceles triangle. The most successful way to approach this question was to use the diagram and mark angles on it. Knowing that the angle vertically opposite the given angle of 47 was also equal to 47 was key to making progress in this question, and those students who did not use the diagram often found this difficult to communicate. Knowledge of triangle types was very mixed, with answers of scalene, equilateral or right angled being quite common even after correct working showing that there were two equal angles.

Question 7

The majority were able to show the correct working for one type of pack lasting either 10 or 12 days. Just over two thirds successfully went on from there to find the total number of days all of the packs would last. Some attempted to subtract repeatedly for the division and often made mistakes or stopped before getting as far as 0. A small number of students did not know what to do and added or subtracted combinations of the values given in the table.

Question 8

The vast majority knew how to approach the pictogram and did so successfully. Where errors were made it was often in using the 'half' symbol to find the number of votes for Kim, or thinking that Liam's votes were to be found by subtracting the number of votes for Kim from the number of votes for Jo.

Question 9

Approximately 80% listed at least one of each of the correct combinations of the pizza toppings. Although there were only three combinations needed it was quite common for students to go on to list different rearrangements of the same combination of toppings. A small number misunderstood and gave different rearrangements of the given combination.

Question 10

Over half gave the correct answer for part (a), common errors were to round or truncate to 37 or 38 or to give a decimal answer.

Almost half gained both marks in part (b), with approximately a further third gaining one mark, often for stating 0.46 as the answer or stating the correct conversion of the fraction followed by incorrect rounding. A common error was to multiply by 100 as part of the conversion, this was often then rounded correctly to 2 dp for a follow through mark.

Question 11

Only a small proportion gained all three marks here. It was quite common for the first statement to be correctly selected as being True, then the second statement incorrectly chosen to be Not true. The third statement was often chosen to be True, but not always in combination with the first statement being correct.

Question 12

Just over 10% gained both marks for part (a).
It was quite common to write -4^2 instead of $(-4)^2$ and then give -16 as the result, often with -44 as a final answer. It was quite common to see 4^2, having 'dropped' the negative sign, then follow this with + 28 and a final answer of 44.
In part (b) almost half successfully made w the subject of the formula. Common errors were to swap the '-1' from one side to the other and give y - 1 as the answer.
Approximately one third gained two marks in part (c). Where students gained just one mark it was usually for multiplying out the brackets correctly. It was quite common for students to incorrectly combine constant terms to terms involving a letter so that a + 2 often became $2a$ and $6a + a$ often became $6a^2$.

Question 13

Approximately one third gained both marks here. It was quite common to subtract one minute then not reduce the minutes further when subtracting 28 seconds. Hours with 100 minutes and minutes with 100 seconds were also quite commonly seen in working.

Question 14

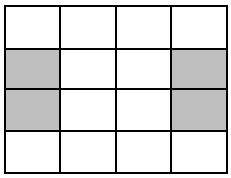
Just over 10% managed to solve this pie chart problem correctly. It was quite common for students to manage to find the angle Apple correctly and then to make no further progress. Some did manage to use 120 and 90˚ successfully to find either the number of degrees per person or the number of people per degree. Having found this value correctly they often did not know how to use it correctly and the fraction $\frac{4}{3}$, when found, was often subsequently rounded prematurely to 1.3 before being used.
A common misconception was to think that frequencies could be added to or subtracted from angles.

Question 15

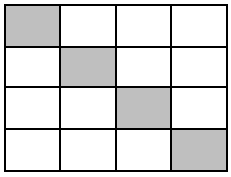
Approximately 40% were able to find the correct rate and approximately half of these also gave the corresponding units. The best responses used the largest triangle to find the gradient. Incorrect rates often just gave the value 240 from the graph or were from an attempt to use a smaller triangle with 20 being quite common from this approach. There were some excellent conversions seen from litres per minute to litres per hour and litres per second.
Students generally gained more success in part (b) than part (a) with approximately 40% gaining both marks. It was quite common for students to draw the horizontal line to 20 minutes rather than extend the line for 20 minutes. The final part of the graph was often drawn to 41 rather than 42 on the horizontal axis.

Question 16

Most realised that 4 squares had to be shaded, but these did not often have exactly two lines of symmetry. The most common correct responses were

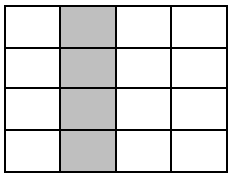


and



or rotations of these.

The most common responses had 4 or 8 squares shaded in with only 1 line of symmetry. Amongst these



was very common.

Question 17

This was found difficult by Foundation tier students with approximately 20% gaining all three marks. Those who did convert 7cm correctly to get 280m usually chose to tick the correct box. It was fairly common for students to multiply the 4000 by 7 to find 28 000 for the first mark, and to then compare this directly with the 300m given in the question with no further calculation.

A significant proportion of students were unable to access any marks. Common errors were to divide 4000 by 7 and to start with multiplying 7 by 100

Question 18

Less than one third chose the correct option. The most commonly chosen option was 'X is directly proportional to Y'.

Question 19

Most students realised that squaring was involved when using Pythagoras' theorem and attempted to square 1.5 and 1.7

Incorrect statements were common, with many equating squared values to a square root or thinking that $1.5^2 + 1.7^2$ was required.

It was quite common to think that finding the square root of a number meant divide it by 2.

Question 20

In part (a) approximately one third found the correct difference in the number of spins. The majority did not realise that the expected number of Heads was found by multiplying the number of spins by the relative frequency. It was very common to see the following errors:

- 125 – 80 = 45
- 0.35 – 0.32 = 0.03
- 125 ÷ 0.32 and 80 ÷ 0.35

In part (b) approximately 30% chose the correct response with a valid reason involving the number of trials.
Many made irrelevant and incorrect statements, often commenting on the number of heads or the relative frequencies or just repeating the number of spins.

Question 21

It was rare to see a fully correct response to this question. The majority either worked out 895 ÷ 537 or 895 × 537

Question 22

Approximately one eighth were able to find the length of the side correctly, and about the same number knew that sine had to be used but were unable to make further progress.
It was quite common to see responses that suggested that trigonometry was not well understood, with some squaring sides, some adding angles, cos 40 and (sin 40) ÷ 21 all being seen quite frequently.

Question 23

This question was quite poorly answered. When one value was correct it was usually 8.5 with the upper bound often being 9 or 9.4 or 9.49

Question 24

It was very rare to see a fully correct solution. The majority decided to find 20% and subtract it with 307 200 being a very common answer.

Question 25

Approximately one third gained some credit for one or more expressions correctly stated and simplified.
Common errors were:

- misplacing the 5
- introducing brackets
- including multiplication signs in their answer
- using '+' signs into their expressions
- combining indices with the 5 to get 10 in their answer

Question 26

Very rare for to see good solutions to this area problem.

Common errors:

- adding the two opposite sides instead of equating them to get $6x + 18$
- $4x + 1 = 5x$ and $2x + 17 = 19x$, so the area is $5 \times 19 = 95$
- solving the correct equation to find $x = 8$, then using that as the shorter side so the longer side is 24, so area = $8 \times 24 = 192$

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