Realising potential

GCSE

Mathematics

8300/1F: Paper 1 (Non-calculator) Foundation

Report on the exam

June 2022

Contents

Summary

Overall performance compared to last year

There was an improved overall performance compared to June 2019.

Topics where students excelled

- Estimating
- Finding missing side of isosceles triangle
- Combinations
- Order of operations
- Identifying an outlier
- Money and multipliers problem
- Working backwards on a term-to-term rule

Topics where students struggled

- Proportion and probability
- Linear graph
- Working with powers of numbers
- Identifying a cubic graph
- Calculations from a graph showing rates of pay
- Multiplying fractions
- Multiplying decimals
- Area of a circle
- Solving a linear equation

Multiple choice questions

Which questions did students find most accessible

Questions 1 and 28 were the best answered multiple choice questions showing a good understanding of using the four rules of numbers and working with ratios and fractions. Questions 1 and 2 were the two questions that the most students attempted.

Which questions did students find least accessible

Questions 21 and 27 were less well attempted. Question 21 had a fairly even spread of choices made by students across the options for the two cubic graphs and the quadratic which cut the axis below zero. Question 27 had roughly half of the students scoring the mark, even though it had the second greatest percentage of non-attempts

Individual questions

Question 3

This question was well attempted with the students in the main demonstrating a correct rounding to the nearest 10. Those who only rounded one from 31 and 18 could still go on to score two marks with a correct answer to their multiplication. The most common wrong answers coming from 20×30 were 500 and 60. Many students counted up in 20s or 30s instead of recognising $2 \times 3 = 6$ and then putting on the two zeroes.

Question 4

Most students successfully calculated the length of a longer edge in this isosceles triangle, showing a great understanding of both the properties of the isosceles triangle and of the perimeter. Arithmetic slips only lost the final mark. For those who didn't understand how to approach the question, it was more common to see them dividing 22 by 4.

Question 5

This was very well answered with the usual mistake being that the student duplicated the given combination, thereby losing a required combination.

Question 6

Both parts of this question were very well answered.

In part (a), the most common mistake was to confuse the $<$ with $>$ and then to tick the top box. Evaluations were mostly correct but the usual error was for $29 - 10$ to become 9.

There were three errors commonly seen in part (b): incorrect use of order of operations so that they calculated $60 \div 6$, using the 2 twice which gave $30 + 6$ or arithmetic slips in halving which resulted in $32 + 4$.

Question 7

Students were comfortable answering this question with over half of them scoring full marks. However, a significant number of students multiplied the 49 or 14 by 100 before starting to work on the multiplying by 2.5 or by 4. There were no problems with converting between pence and pounds, but those who converted either at the start or at the end tended to score better than those who worked with mixed units.

Question 8

Students were able to identify and work with either the mode or the median, but it was more difficult for them to use both in this question. The pupils who listed their numbers in ascending order scored better than those who did not. The misconception that the centrally written value was the median, rather than the central number, when written out in ascending order was very apparent. It was very common to see an answer such as 8, 8, 12, 4, 6. The mark scheme covered any student who missed the requirement for 5 numbers and offered a mark for a set of 4, or more than 5 numbers with mode 8 and median 12.

In part (b), it was common to see an answer of 91, perhaps where the student has muddled outlier with mode.

Question 9

Many students were able to score marks for getting as far as the 7 and then the 3, but then mistakenly put the 3 over 14 and found it very difficult to get that into a correct percentage. Workings were not often shown to get to the 7 but were then shown to get to the 3.

Question 10

In part (a), the conversion that was seen the most was 1.2 m to 120 cm followed by 1 m to 100 cm. Often it was not the correct two sides that were used in the final fraction. The students who tried to work in metres and correctly converted 40 cm to 0.4 m were then often unable to process the resulting fraction because of the decimals involved.

In part (b), most students made a good start in subtracting the given angle from 180°. Following that, it was most common to divide by 3, instead of 4, and it wasn't uncommon to see 112 being divided by 3.

Most students misunderstood the $x = 3y$ equivalence and divided the 68 by 3 instead of 4.

Question 11

Many of the problems that occurred during both parts of this question stemmed from the students using the wrong information from the table. In part (a), the most common mistake was to total the rows for each of A and B and then find the difference, but it was not uncommon to see students adding the two values in the row for A, instead of subtracting them. In part (b), it was the students who adopted a more formal approach that were more successful. Those using repeated additions often lost their way in how many they had added together. Provision had been made in the mark scheme in part (b) for those using the correct methods on incorrect values, so that a demonstration of sound mathematics was rewarded.

Question 12

The students felt comfortable attempting this subtraction of fractions, but more than half of the students simply subtracted the numerator values and subtracted the denominator values instead of finding a common denominator and altering numerator(s) accordingly before subtracting the numerators.

Question 13

Part (a) was particularly well answered. Students were showing their working when it came to 23 ÷ 2, and this wasn't always done correctly (often ended up as 11.1), but they had already gained the two marks for showing their method at that stage. There was a small misconception by some students that they needed to do the division three times in total. This only lost them the final mark, even if we hadn't seen their working.

In part (b), it was great to see so many students checking their work. Again, there was sometimes a misconception that they needed to have four numbers between the two given values (because 1st and 4th terms were mentioned in the question). Those using a "trials" method often did not score highly for those not hitting upon the correct answer because they didn't always complete the correct number of subtractions at each trial. It was very rare to see an algebraic approach.

Question 14

We saw a lot of miscounting in this question and a lot of mis-configuring the 7, the 2 and the negative sign within the vector. Other than the mis-configuring, the most common wrong answer was $\begin{pmatrix} 4 \\ -1 \end{pmatrix}$, found by taking the bottom right corner of A to the top left corner of B.

Question 15

Many students made a start on answering this by adding the two given fractions but didn't link the $\frac{1}{8}$ to the 10 discs and didn't get to a total 80 discs so were unable to use their resultant fraction any further.

Question 16

This was very poorly answered with not many attempts made to draw the graph that was asked for. Some students had a correct table of values but misused the scale when plotting their points. The mark scheme took care of any student who had a line crossing the given line, but most students attempting to read off the point of intersection were giving both the x and y coordinates, not just the x coordinate that was asked for. A significant number of students ignored the graph and attempted to solve the equation algebraically; they were mainly unsuccessful.

Question 18

It was more common to see students attempting the division with the given numbers and then converting to standard form, rather than the other way around. Just over half of the students scored at least one mark for this, and that was mainly for those getting as far as 400 000. The most common wrong answers were those giving 0.4×10^6 as the answer or miscounting the number of zeroes after the 4, the 8 or the 2.

Question 19

For part (a), it was most common to see a final answer of 3^5, with students forgetting to convert that to an ordinary number. A popular answer saw students "cancelling" the 3's and getting to 1^5. In part (b), students were able to process the $2^6 \times 2^4$ to correctly give 2^{10} but unable to link the 8 with 2^3 and so unable to fully finish their answer as a power of 2. It was not uncommon to see $2^6 \times 2^4$ becoming 4^{10}, where the base numbers had been added as well as the powers.

Question 20

Students showed good understanding about the correct presentation of a Venn diagram. They were easily able to identify the lack of labels and a pleasing number checked the total and found it to be one too many represented in the Venn diagram. There was a common misunderstanding that the Venn diagram showed only 16 students studying French, not realising that the 25 were also studying French. It was great to see criticisms rather than students simply trying to correct the given diagram.

Question 22

Students struggled with the context here and were not expecting to have to calculate with the readings they took from the graph to get an hourly rate of pay. The most common wrong answers were 450 : 250 becoming 9 : 5 and 30 : 10 becoming 3 : 1 by just using the pay or just using the number of hours.

Question 23

In part (a), most students had identified that the numerators of 1 and 3 were required and denominators of 2 and 5 but many didn't fully realise the constraint of each fraction needing to be less than 1. Hence the most common answer seen was $\frac{3}{2} \times \frac{1}{5}$. For part (b), we had a similar issue that the values in the boxes needed less than 1, so answers of 1×0.6 were not accepted. Students could see that they needed a 2 and 3 to be involved and that they needed two decimal places, but, unfortunately, this often translated into them offering 0.02 and 0.03

Question 24

For students who attempted some sort of bisector, it was often the bisector on an edge rather than of an angle. This was not a question that the students found it easy to engage with. Those that picked up a mark had often drawn a line up to AD from B and labelled the region to the left of it with an R but done nothing towards bisecting the angle.

Question 25

Students found the fractional part of the question tricky because of arithmetic slips earlier in the question or because they'd used a value for π. Often 15^2 became 125 which, when divided by 3, was not a number that would divide easily into 300, to give a final answer.

Less able students worked with circumference rather than area, and those that missed that areas were required simply tried to use the fractions given to give some sort of an answer. For the more able student, a common error was to subtract their two areas, rather than divide them, answering the question of "how much bigger" rather than "how many times bigger".

Question 26

The most successful method was to get a common denominator of 15 and compare the numerators and work from there. Lots of students multiplied the 4 and the 5 and solved $\frac{2w}{15} = 20$.

Another very common incorrect answer was to forget that the numerator was $2w$ and give 12 as the final answer.

Further support

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