



LEVEL 3 CERTIFICATE

Mathematical Studies

1350/1

Report on the Examination

1350

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General

The exam was accessible to the students, with no evidence of a lack of time. All questions were attempted by the majority of students, with working usually shown. There was evidence of insufficient space for some questions, with a significant number of students using additional sheets. Generally, students seemed familiar with the topics for this paper on this new specification.

Topics that were done well included:

- drawing box plots
- simple budgeting
- Fermi Estimation.

Topics which students found challenging included:

- sampling techniques
- reverse percentages
- interpreting a histogram.

Question 1

In part (a), the majority of students knew that the data was quantitative but a large number chose continuous instead of discrete. Less than half of students could correctly calculate all the values in part (b), with the quartiles causing the majority of the problems. A small number of students had values for the median that were the same or lower than their lower quartile value. The lowest and highest values were usually correct, although a small number of students gave 92 as the highest value, possibly as it was the last value in the list of data.

The drawing of box plots was generally well done, following their values from part (b) for Paper 2. Students must remember to label diagrams, particularly when there are two of them. Students struggled more with comparing the performance, with many just comparing particular values such as lower quartiles or the highest value. For full credit, students must always compare average and spread and relate these values to the context. Statements such as ‘the median was higher in Paper 2’ need to be related to context in greater depth.

Question 2

This question was poorly attempted by many students. The majority could increase £22.50 by 20% but then tended to find 90% of this answer. The least successful students added the 20% and 10% together and either increased or decreased 22.50 by 30%

Question 3

In this estimation question students generally made a good assumption about the average amount of fruit and vegetables eaten per day, with quite a large number using the recommended 5 a day. Units were not always quoted, however, with statements such as ‘assume the average person eats 3 fruits and vegetables per day’ frequently seen. This type of statement is unclear, whereas ‘3 portions of fruit and vegetables per day’ was acceptable. Those students who worked with weight usually remembered to include the units in their answer, but there were a small number of very unrealistic assumptions about the weight of a fruit or a portion of vegetables.

In part (b), a popular response was to suggest doing a survey or collecting data to base your estimate on. This was acceptable if the student stated what the survey was about, and the survey was realistic and pertinent. Unacceptable surveys included asking too many people, eg all the people in the UK, or suggesting that people record the amount of fruit and vegetables they eat every day for a year.

A small number of students suggested that a good way to improve the estimate was to find out the actual amount the average person eats in a year.

Question 4

Many students correctly stated that a stratified sample by gender would be a good method to use as there were more girls than boys. Key words such as ‘proportional’ and ‘representative’ were clearly understood. However, quite a few students thought it was **not** a good method as there were more girls than boys. Part (b) asked for a description of how to use random numbers to choose the sample. A small number of students simply suggested putting the girls’ names in a hat, with no reference to random numbers at all. Fully complete answers including numbering all the girls, using a random number generator or random numbers on a calculator and ignoring repeats, were very seldom seen, although a large number of students did describe either the first or both the first and second parts of this answer. There were some very unusual answers to the sampling method in part (c), with only a small number of students correctly identifying a cluster sample. A minority of students named a sampling method not on this specification, but if appropriate this was acceptable.

Question 5

Many fully correct solutions were seen. The majority of students coped well with the context and calculations and came to a correct conclusion. A small number of students multiplied the net pay by 7 months but then did not multiply the payment to the parents by 7. A very small number of students subtracted the £250 from £838 before working out the 12% pension.

Question 6

This multi-step tax and National Insurance question differentiated well between students. Quite a large number of students worked out the tax and NI on the old job as well, even though they had been given the net pay. Almost all students could make some progress, but many struggled with the need to work out higher rate tax and NI. A small number thought that the higher tax rate was on the whole taxable income. Many students did not appreciate that National Insurance had a higher limit as well, or deducted the personal allowance before working out the NI.

Students usually included the travel costs, but occasionally included one month's travel with their annual net salary.

Students should be encouraged to set out their work clearly, particularly in these long questions. It was sometimes quite difficult to work out what figures a student was using and what amounts they were carrying forward to the next part of the calculation.

Question 7

More successful students coped well with the frequency density scale and gave correct solutions. A significant number of students had difficulty with either the frequency for under 21 or the frequency for 65 and over. These students often decided that there were only 60 people under 21 or that there were 18 people aged 65 or over. A small number missed the people between 64 and 65 years old.

Question 8

This student loan question differentiated well between students with the more successful students coping well with all the information and calculations required. Common errors included omitting to calculate the 5.5% interest and calculating it incorrectly. The majority of students calculated the 9% payable, but some then divided by 10 to get the monthly payment. A final common error was to find the difference between the amount paid back and the loan without interest. A small number of students tried to work out income tax and National Insurance in this question before calculating the amount of loan payable.

Question 9

There were some excellent responses to this estimation question. The best responses clearly stated the assumptions they made about the number of people in each of the different sized houses. There was a large variety of approaches - some students gave an average number of people (eg 4) for all the 3 and 4 bedrooms and then an average (eg 2) for the 1 and 2 bedroom houses, while others found the average of the water used for, say, 4 and 5 people for the 3 or 4 bedroom homes. Other students decided to have a proportion of the family homes as 3 bedroom and the rest as 4 bedroom, and some split this even further to either 3 or 4 people in a 3 bedroom house for example.

It was sometimes unclear what assumptions some students were making, with various values appearing with no explanation. Students should be advised that they must state clearly what assumptions they make – in this case about the number of people and the values they had decided to use for the water use each time.

The mathematics involved once values were chosen was quite straightforward, and few students had problems with this. A very small number of students multiplied the water used by the number of people in the house. Some students did not divide by 365 to find the daily usage, giving their annual usage as the final answer.

It should be remembered that this is **estimation** and therefore it is not sensible to give final answers which include decimal places.

A very small number of students ignored the preliminary material and made up their own water usage figures by estimating how many litres are needed for showers, etc.

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