Level 3 Certificate
MATHEMATICAL STUDIES

Paper 1
Report on the Examination

1350
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General

The paper was accessible to the target group with all questions attempted by the majority of students. Methods were generally shown clearly and conclusions given where required.

Question 1

This question was generally well attempted with most students able to find percentage increases and compare them. The main error for unsuccessful students was to calculate the increase as a percentage of the new salary.

Students almost always gave a conclusion following their answers.

Question 2

In part **(a)** there was a lack of understanding of what a cluster sample is and why it might be used. Students did not identify the main advantages of convenience, speed and cost very often. The most common error was to state that it was a suitable sampling method as it would include people from all the gyms. Students could also gain credit if they gave a valid reason why it might not be suitable – for instance by stating that one particular gym may be different to the others.

Only a very small percentage of students gave a full and valid explanation worthy of 2 marks.

Students could usually name the correct sampling method in part **(b)** although there were many spelling errors.

Part **(c)** was very well answered. The main error when seen was that students did not fully answer the question. They found the number of male and females needed for the sample but failed to subtract females from males, therefore failing to gain full marks.

Question 3

This use of an iterative formula to calculate the outstanding mortgage was generally well done. Where errors were made, it was disappointing to see students at this level unable to use correct money notation. Rounding is always expected although students may use the complete figure in their calculators for the next step. Rounding down to the nearest penny was also accepted as this is common practice in the real financial world. A small, but noticeable minority showed a lack of understanding of the use of an iterative formula, subtracting 1 from '1.002 x previous month' by misunderstanding the suffix 'n-1'.

In part **(a)** many students thought that the interest was the difference between the amount outstanding in month 0 and month 4. The most successful students worked out this value but then remembered to subtract the 4 payments of £710.

Quite a large number of students worked out the interest each month. This was a valid, though time consuming, method but often led to students adding 5 months' worth of interest instead of 4.

Question 4

Students are improving with this style of question with the majority of the students gaining full marks. The main issue is that some students have a tendency to over complicate their answer rather than seeing the question as a simple estimations question. These students decided to break down sleep patterns into age ranges, for example 12 hours sleep for 0-2 year olds, 11 hours sleep for 3 -10 year olds etc. This often led to an incorrect total number of years being used as students would overlap years or not include both ends of their range.

This Fermi estimation question only required a single estimate of an average number of hours per night to cover the whole lifetime. Students sometimes reduced or increased the hours by stating that weekends or holidays or celebrations may incur a different number of hours sleep –again missing the point of a rough estimation. Whilst students did not lose credit for long winded approaches they will have lost vital exam time.

There were some excellent very simple answers with assumptions about number of hours sleep and average life span clearly stated. Students should remember to state the number of days in a year they are using.

Question 5

Students could usually select the correct median time with just a small number selecting the mean instead.

The interquartile range proved more problematic with just over half of the students reaching the correct value. Those who did not register a mark often incorrectly identified that the quartile values were not single numbers from the list, and tried to take the mean of 2 values.

Part **(c)** differentiated well between lower and higher attaining students. Many students are still finding it difficult to put their comparisons into context and fully interpret the information. There is a tendency for students to just compare the size of all the values available rather than concentrating on the average and IQR, with reference to what the average is showing and the consistency or variations within the data. Some comparisons were not in context, for example 'the median of the class 10A boys was lower', without stating what this meant in terms of performance.

Question 6

This question was the most poorly attempted question on the paper. Quite a number of students could find the amount for Payday Help by using compound interest but the vast majority struggled to use the APR formula. This is the first time this formula has been used on this specification and it was clear that the majority of students did not know how to use it. They did not understand that there was only one payment so no summing was needed. They also did not realise that as t_k is the time in years, they would have to write the 6 days as a fraction of 365 days. Students should consider whether their answers are sensible as some had the 'See you Through' repayment being thousands of pounds.

Question 7

Part **(a)** was answered very well with the majority of students showing a good understanding of frequency density. There were occasional errors in drawing the correct height, and a few instances of wider bars at the ends of the histogram.

In part **(b)** many students seemed to struggle with what is meant by proportion. Approximately one third of them interpreted the histogram correctly to finding the correct numbers of sunflowers A and B, but then just compared the raw figures without any consideration to the total amount in the group. Only a fifth of students compared the proportions with the most common method being to convert them to percentages.

Question 8

This question was generally well attempted. Most students had been well prepared to calculate income tax and NI and so were able to calculate the net pay for the year. Some students found calculating the travel and nursery fees difficult, with common errors being:

- Only working out the amount for 1 day per week
- Working out the fees as if Sarah worked all 7 days of the week
- Struggling to cope with the fact that she would not have to pay fees for her 4 weeks holiday
- Thinking that there are 4 weeks in a month and therefore 48 weeks in a year.

Some students made errors from trying to calculate National Insurance weekly rather than annually. A small number did not consider the 'allowance' before paying National Insurance, although they seemed to understand the personal allowance for income tax.

Question 9

This extended estimation question was more demanding than in previous years, and fewer students gained the highest marks. The question discriminated well with all levels of students being able to make some progress. The higher attaining students were very good at stating their assumptions at the beginning and upon embarking on a new area of calculation. These students tended to gain more credit by being methodical and clear in their workings, leading to fewer errors. Weaker students either did not state any assumptions or just stated a figure for the number of litres per week without explaining how it was derived.

Common errors included failing to convert the volume of the can (in cm^3) to litres, and so dividing the volume of soup produced in a week (litres) by the can volume in different dimensions.

Very few students took into account any wastage at all, thinking that the number of cans that each sheet could make was simply the area of the sheet divided by the SA of a can, despite the circular top/bottom and other wastage.

Many students knew the correct formulae needed although the lower attaining students either mixed up area and volume, or thought that the curved surface of the can was found by multiplying the diameter by the height.

Part **(b)** required the students to explain HOW an assumption that they had made would affect the number of sheets. It was very common to see JUST the assumption being stated, which gained no credit. For example, stating that 'the factory may have been open less days', was insufficient and need to be qualified by 'so less sheets/cans would be needed'.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website.