LEVEL 3
MATHEMATICAL STUDIES

1350/2A Statistical Techniques
Report on the Examination

1350
June 2016

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General

The majority of the students attempted all questions. Students made good use of both their calculators' statistical functions for regression and of the statistical tables. In many cases a good grasp of statistical techniques and error identification in calculation were seen. However, many students struggled to gain marks on questions requiring comments and interpretations of statistical methods.

Topics that were done well included:

- improvements on graphs
- identifying errors
- critical analysis in currency conversion
- interpreting and solving problems using regression line
- working towards constructing a confidence interval.

Topics which students found challenging included:

- the Normal distribution
- identifying appropriate statistical methods and analysis
- defining a population sample
- calculating a combined mean
- stratified sampling.

Question 1

There were few incorrect answers in part **(a),** with the majority of students able to deal confidently with standard form. The most common incorrect response was 1230×10^6.

In part **(b)**, some students did not gain marks as they did not suggest improvements but simply identified errors. Many incorrect suggestions were related to the physical appearance of the bar chart rather than its presentation.

In part **(c)**, the majority of students scored at least one mark for recognising the arithmetic errors in the calculated mean. However, very few recognised that the numbers written in the question were not in millions as opposed to the original data.

In part **(d)**, many students struggled to use stratified sampling correctly. They did not manage to calculate the final number of Facebook users, which was 940 million, and often mixed up numbers of Facebook and Instagram account users.

In part **(e)**, many students correctly found the value of the shares and made the right

conclusion. A minority of students performed premature rounding, which led to an answer of £2000, losing an accuracy mark.

Question 2

In part **(a)(i)**, students were much more successful than in part **(a)(ii),** although both parts required the same skills in identifying errors or improvements in the data presentation. In part **(a)(ii)**, it was very common to see responses such as 'title of columns missing', 'put in same units' and many more, which scored no marks.

In part **(b)**, for Paul's statement, a few scored the full four marks. Some students attempted this calculation by assuming that the total world population is about 7 billion. However, the question was about adult population, which is well under 7 billion, and hence they gained no marks. For Rena's statement, many students scored the full two marks and showed a good understanding of the meaning of progression.

Question 3

This question was generally well answered. Most students successfully found the z-value or the mean height of the random sample. Some were able to correctly use the formula to find the confidence interval. However, quite a large number of students made one or more errors in using the formula. Very often, students used 10 or 40 instead of $\sqrt{10}$ or $\sqrt{40}$, and some incorrectly used 90% or 0.90 as their *z*-value. A very small number of students made wrong comments based on their confidence interval value.

Question 4

In part **(a)**, many students struggled to define a population sample in context. Students contradicted their own initial statement about the population of cars passing the school between 3 pm and 4 pm by suggesting other time intervals. Some also used vehicles other than cars in their definition, which gained no mark.

In part **(b)**, students found it difficult to calculate a combined mean. It was not uncommon to see responses such as $(24.1 + 23.1) \div 2$ or $(24.1 + 23.1) \div 30$.

In part **(c)**, the proper use of statistics functions found on the scientific calculator was evident. Where marks were lost, it was usually for plotting the calculated line inaccurately, either by eye or by using only the mean point instead of using two calculated points.

In part **(d)**, most students were able to identify the value of *C* needed to find the corresponding value of *F,* either by using their equation of the regression line or by reading the required value from their graphs.

Question 5

A large number of students scored no marks in this question as a result of not identifying the appropriate statistical analysis and reasoning. A significant majority of students calculated the mean, variance and standard deviation of the subjects (maths, English and sciences) and made the comparisons in these values before making an incorrect conclusion. Most students who identified that the values of the pmcc (r) needed to be calculated did so correctly and were able to gain four out of the five marks available in this question. Of these students, very few gained the final one mark. The vast majority of students failed to explain that extrapolation affects validity.

Question 6

Only the most successful students scored well in this question.

In part **(a),** many students managed to correctly find the mean and standard deviation of journey times for bus B. However, they failed to find the arrival times and proceeded to make comments about the arrival times using the mean journey times, for which no marks were awarded.

In part **(b)**, a significant majority of students failed to present the correct calculations using the Normal distribution. Misuse of the journey times and arrival times resulted in wrong values of z being found. Most students were able to use the statistical tables to find the correct probability for their value for $z,$ but some failed to do this when their $z > 4$. Very few students stated the correct assumption.

Mark Ranges and Award of Grades

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

Converting Marks into UMS marks

Convert raw marks into Uniform Mark Scale (UMS) marks by using the link below.

UMS conversion calculator