AQA

**Free Standing Mathematics Qualification
June 2011**

Mathematics Advanced Level   6990

(Specification 6990)

Using and Applying Statistics

Report on the Examination

General – Written Component

The paper was accessible to its target group with no evidence of candidates running out of time. The majority of candidates scored marks on all of the questions on the paper. Almost one half of the candidates performed well, scoring above the mid 30s. It was evident, and pleasing, that many candidates were well prepared for this examination and a number of excellent scripts was seen. A minority of candidates appeared not to have a scientific or a graphical calculator in this examination. It is imperative that the candidates are proficient at using a scientific or graphical calculator. Candidates are expected to use a calculator to check their working in answering all of the questions in this examination. Occasionally candidates performed calculations using their calculators and showed no methods. Candidates need to be aware that one incorrect value inserted into their calculator would lead to an incorrect answer and with no working shown they would lose all the marks for that part of the question. Some candidates lost accuracy marks for not working to an answer correct to 3 significant figures or the required degree of accuracy as specified in that particular part of the question. Some candidates gave no indication of any familiarity with the contents of the data sheet whereas others had clearly been well prepared in advance of the examination.

Topics that were well done included calculating percentage change; describing the trend and reasoning; obtaining cumulative frequencies, finding the median and interquartile range from their cumulative frequency curve; drawing a box plot; using a calculator to obtain means, a correlation coefficient and the equation of a regression line; one-sided standardising and obtaining upper tail probabilities from a normal distribution.

Topics which candidates found difficult were interpretation of mean and standard deviation in context; two-sided standardising and obtaining probabilities from a normal distribution with negative Z values.

Question 1

Candidates who had familiarised themselves with the data sheet before the exam had the opportunity to rehearse all the calculations required for this question. For both parts of the question a variety of successful approaches were seen. The majority of candidates scored both marks in part (a) and a large number gained all 3 marks in part (b).

Question 2

In part (b) some candidates did not understand how to describe a trend – they listed each individual change from quarter to quarter.

In part (c) there were many calculations involving successive multiplication by 0.9 and they were usually successful. Subtracting 10 % manually provided opportunities for error.

Question 3

A significant number of candidates were able to complete the cumulative frequency table but seemed unfamiliar with the drawing of a cumulative frequency diagram. Some were prompted by the requirement to find a median and inter-quartile range to superimpose a cumulative frequency diagram over their original cumulative bar chart, but then used the mid-points instead of the upper boundaries.

In part d(iii) the candidates' comparison of the distances travelled to work frequently involved their simply stating the medians and interquartile ranges rather than interpreting them in

context. Use of statistical language was not precise, the most common example being the misuse of the term range.

Question 4

Candidates producing answers for means and standard deviations from their calculators should be encouraged to use their time well by checking their entry of the data – an incorrect answer with no working offers no opportunity to achieve marks.

In part (c) the comparison of means and standard deviations was again lacking in interpretation in context.

Question 5

This question was well attempted by the majority of candidates although it needs to be reiterated that candidates have to be encouraged to use their time well by checking their entry of the data – an incorrect answer with no working offers no opportunity to achieve marks. The use of calculators for statistical measures such as correlation coefficients and equations of lines of regression are simple if the data entries are correct.

In part (c)(iii) a few candidates gave no evidence of using their equation to draw their line of regression, or showed that they were using the fact that the correct regression line will always pass through the correct mean point.

Question 6

In part (a) the calculation of the upper tail probability was done very well by the majority of candidates. In part (b) there were many indications that candidates were not familiar with using linear interpolation and so rounded answers prematurely. Some convoluted solutions would benefit from diagrams or explanations to aid the candidate's understanding and also show their method too.

Portfolio

There were some excellent portfolios produced by centres which followed the principle of FSMQ to take data from other subjects and produce relevant mathematical analysis.

Some centres, however, gave out very prescriptive task sheets which did not always enable candidates to produce independent work. Candidates would benefit from more 'open-ended tasks' which allow the candidates to develop their work independently.

Mostly, work was produced at the correct Advanced level but there were still centres producing 'Using and Applying Statistics' portfolios where no extension work was attempted. This resulted in a bare pass mark as there was no Advanced level work. It should also be remembered that to obtain a Grade A for 'Using and Applying Statistics' work on significance tests such as t-test, Z test, Mann Whitney test, Wilcoxon signed rank test or the Chi-squared should be attempted. Similarly candidates cannot be awarded a Grade A for 'Modelling with Calculus' unless there is evidence of differential equations and the differentiation/integration of functions such as trigonometry functions, exponential functions etc.

Many centres developing 'Working with Algebraic and Graphical Techniques' portfolios produced excellent reports on the fitting of a function to non-linear data by plotting a linear function. Original data was also used in many cases. However, there were still some centres where candidates did not seem to fully understand the linearization process and

could not explain their methods. Candidates producing portfolios which did not include algebra manipulation, such as equations, logarithms etc. could only achieve a mark in the mid thirties.

Candidates generally indicated when they were checking their work. Checking is an important part of the FSMQ ethos, so should be encouraged. Checking was particularly evident in 'Modelling with Calculus' portfolios where candidates were adept at comparing integration methods with numerical methods.

In Strand 3 there were some excellent conclusions drawn by many candidates. They considered how their initial data and assumptions affected their 'real world' findings and used mathematics to summarise their results. However, a few candidates seemed to 'run out of steam' and provided very brief conclusions.

Centres are to be congratulated on the hard work that was behind many portfolios, working with colleagues from other departments in order to obtain data, and lastly in providing samples promptly for moderators.

Mark Ranges and Award of Grades

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

UMS conversion calculator www.aqa.org.uk/umsconversion.