LEVEL 3 CERTIFICATE
MATHEMATICAL STUDIES

1350/2A Paper 2A Statistical Techniques
Report on the Examination

1350
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General

This was the second examination of this specification and the students found some of the questions to be very demanding. The majority of students attempted all questions.
Students made good use of both their calculators' statistical functions for regression and the booklet of formulae and tables. Questions that required qualitative responses were generally poorly answered, and students would probably benefit from a greater focus on this area in future.

Topics that were done well included:

- identifying errors in a table and improving them
- calculating cost
- recognising features of a normal distribution diagram
- identifying, calculating and comparing strengths of correlation
- solving problems using a regression line.

Topics which students found challenging included:

- percentages (decrease and reverse)
- extracting and critically analysing given data and information
- normal distribution
- understanding confidence intervals.

Question 1

Students generally scored highly on this question, although in part (a), some students did not gain marks as they did not suggest improvements but simply identified errors. Common incorrect improvements were 'add a total cost column', 'find more providers', 'add new column for pay as you go', and 'display his budget'. The majority of students who scored full marks linked their improvements to the errors identified. There were many highly successful responses to part (b), although some inefficient methods were used for finding percentages. At this level students are expected to use multiplicative methods, ie multiplying by 0.7 to find a 30% discount rather than first finding 10% etc. A minority of students performed premature rounding, which led to a loss of the final accuracy mark. Some neglected to add the one-off payment of £109.99 to their calculated 24-month cost.

Question 2

Students scored very poorly on this question, and full marks were rarely seen. Students found it very challenging to extract the required information from the given preliminary material to answer questions in part (a) and (b). The instruction 'using the data given' was not always taken to mean that a calculation was required rather than a purely narrative response. The majority of students did not appreciate that, for Always Young, rate refers to figures in percentages. Common responses involved using the actual unemployed numbers rather than the decline in percentage. For Dynamic Youth, many struggled with reverse percentage. Often students worked out the value at 84.8% for men and 87.9% for women and put these into ratio and proceeded to simplify it. Many found it difficult to compare their figures with the given ration of 11:10. In part (c), many students did not gain marks as they did not suggest improvements but simply identified errors. The majority of students scored at least one mark for suggesting that the axes need to be labelled. No students recognised that the figures in the briefing paper were not accurate, ie for 16-24 year olds, 362 000 men + 265 000 women ≠ 628 000. Common incorrect improvements suggested were 'do not overlap the ages', 'colour the graphs', and 'present all data either in numbers or percentages, not both'.

Question 3

Generally, students did not score highly on questions on the normal distribution. In part (a) however, almost all students recognised the correct normal distribution diagram. Many were caught out by the reverse usage of the normal distribution in part (b). Some lost the final accuracy mark for stating 68 as their final answer. Very few achieved full marks for this part. Many students used 0.4 as their z. In part (c), students did not use the symmetrical nature of the normal distribution. Many used information in part (a) by working out 40% of 30 students and then multiplying this by £5, leading to £60 as their final answer and making a wrong conclusion. In part (d), students often lost two marks for not adding on the 30 students in William's class. A minority of students who used their advance scientific calculators' in-built functions accurately in part (b) and part (d) scored full marks for these parts. Almost all of these students were clearly well versed in using the calculator effectively and this should be highly encouraged in teaching the course.

Question 4

Most students showed a good understanding of correlation. In part (a), almost all students correctly matched the scatter diagrams to their respective strengths of correlation. In part (b) and (c), many students calculated the PMCC correctly and were able to gain at least two out of the four marks available in these parts, although some students did not calculate a PMCC and responded with arguments based on values in the tables. However, there were a few students who attempted to calculate the PMCC manually using a formula; this resulted in wasted time, and the answer achieved was often incorrect. Marks were often lost in part (b) and (c) for the absence of a reference to the strength of correlation. Almost all students correctly plotted the missing points in part (d)(i). In part (d)(ii), the proper use of the statistical 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. Some students lost one mark for failing to give an equation for the regression line and many left it as an expression. Unlike last year, there was no confusion between the values for a and b in a regression line. In part (d)(iii), most students were able to calculate the value of C needed to find the corresponding value of S. The majority of students found S by reading the required value from their graphs, but some were unsuccessful in reading it correctly. Very few used their equation of the regression line to find S by substituting the value of C.

Question 5

In part **(a)**, usually those who did not score the mark had confused variance with standard deviation, and common answers were 2.25, 1.22 and 1.50^2. Students made good use of the booklet of formulae and tables in part (b) to find the values of probability for their calculated z scores. Students who sketched diagrams found them useful for the final two marks.

Throughout this question, students often started to carry out the correct procedure by finding the z-score but did not proceed to the next stage of calculating a probability. A minority of students used their advanced scientific calculators' in-built functions accurately in part (b) and scored full marks for this part. Most students fared poorly when answering the questions on the normal distribution.

Question 6

For most students, this question proved to be the most demanding on the paper. Finding a confidence interval by reverse operations proved particularly challenging. In part (a), a large number of students did not work out the mean by finding the middle value of the given 90% confidence interval of (35.2, 41.8) for the mean human body temperature of patients. Many used 35.2 or 41.8 as their mean instead of 38.5 and some also used 35.5 or 41.8 as their standard deviation and lost many marks as a result. However, few then struggled to find the corresponding z-scores at 90% and 99% confidence levels. There were many who seemed unfamiliar with the required procedures and attempted to set up equations with various unknowns and stopped their working after realising they could make no sense of it. A number of students simply stated 99% meant high percentage so the statement was supported.

Use of statistics

Statistics used in this report may be taken from incomplete processing data. However, this data still gives a true account on how students have performed for each question.

Mark Ranges and Award of Grades

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