AQA

ASSESSMENT and
QUALIFICATIONS
ALLIANCE

General Certificate of Education

Mathematics 6360
Statistics 6380

MS/SS1B   Statistics 1B

Report on the Examination

2007 examination - January series

General

The preparation of candidates for this paper continues to improve and, as a consequence, the vast majority of candidates were well aware of the techniques required for each question. Judged on the presentation of notation and solutions, the quality of entry appeared to be of a high standard and, as a result, the overall standard of performance was high.

Typical grade A/B candidates provided correct and accurate solutions to almost all of the numerical and algebraic parts of questions but dropped marks where comments or interpretations were required. This was sometimes not helped by poor handwriting and grammar. Grade E candidates either scored part marks across the paper or reversed a very mediocre performance by scoring quite well on a couple of questions, usually questions 5 and 7.

As was intended, almost all candidates used the statistical functions on their calculators correctly in answering questions 1 and 7. However the 3 missing values in question 1(b) caused some candidates a 'calculator' problem, whilst a small minority were penalised for quoting answers to fewer than three significant figures in question 7(b). Most candidates made appropriate use of Tables 1, 3 and 4 in the supplied booklet in answering questions 2, 4(a) and 6. Candidates from a small minority of centres used their calculators to quote answers without any working in these questions. Some of these candidates lost all the marks for parts of the questions for wrong or inaccurate (less than 3 significant figures) answers. Whilst some degree of inaccuracy is allowed when calculating summary statistics from raw data, this does not generally apply to the same extent in other calculations.

Question 1

Almost all candidates scored the first 3 marks by use of the appropriate functions on their calculators. The small minority who used formulae were also generally successful. Scoring full marks in part (b) was much rarer. Most candidates made sensible attempts but often struggled to find the appropriate terms to use. Some candidates stated values for the upper and lower quartiles but did not then state the difference as their value for the interquartile range. A small minority of candidates first input 3 values greater than 60 into their calculators to then find correct answers. In part (c), general disadvantages of the mode and range were not acceptable answers. Whilst many candidates noted that no time occurred more than once so a mode did not exist, many fewer made explicit reference to the fact that the maximum time needed to calculate the range was unknown.

Question 2

Many candidates scored at least 10 marks on this question. Almost all of them showed a correct expression in part (a) and then evaluated it correctly. Answers to part (b)(i) were also almost always correct with just a small minority of candidates evaluating $P(\text{Continental} = 12)$ from the formula. In part (b)(ii), there was the usual confusion between '$\leq$' and '$<$' when using Table 1 but the majority of candidates were able to score at least 2 marks. In part (c), a minority of candidates did not use $p = 0.7$, whilst many more either misread the request or were under the impression that $np(1-p)$ gave the standard deviation.

Question 3

Almost all of the candidates who stated numerical values, rather than qualitative judgements, scored the 2 marks for part (a) and the 1 mark for part (b). In part (c), most candidates stated a positive value. For those giving a negative answer, values ranged from -1 to 0, inclusive.

Question 4

Most candidates scored at least 4 marks. The formula for the confidence interval was well-known and used correctly by most candidates; an incorrect z-value was the usual error. In answering part (b)(i), many comments observed that the mean for this play lay inside the confidence interval (as of course it must) and so the assumption was valid. This suggested anticipation on the part of these candidates of the type of comment that has been expected following the determination of a confidence interval on previous papers. In part (b)(ii), plays having different popularities or audience sizes were the most frequently seen acceptable reasons for the comment "Unlikely to be valid".

Question 5

This was the best answered question on the paper and centres are to be congratulated on their preparation of candidates for this type of probability question. Almost all candidates scored at least 6 marks, most scored at least 8 marks and many achieved the full 10 marks. Answers to parts (a) and (b) were almost always correct with simple arithmetic slips the usual cause of lost marks. Again in part (c), most candidates scored full marks. Those that did not give an answer of 'answer (b) $\times$ 3', had a numerical error in one of their three possibilities or multiplied the latter together, rather than adding them. In part (d), full marks were again the norm. When this was not the case, the usual error was failing to add $P(\text{one})$ ($=$ answer (c)) to a correct value for $P(\text{two})$.

Question 6

The quality of responses to questions involving the normal distribution continued to improve with many candidates scoring at least 14 of the available 17 marks. In part (a)(i), apart from the small minority of candidates who standardised 44 (0 marks), most candidates scored all 3 marks. Again in part (a)(ii), many candidates scored all 3 marks. Those who did not, usually recognised the need for 'answer (a)(i) $- P(X < 30)$' but then failed to make the necessary area change from $P(Z < -0.875)$ to $1 - P(Z < 0.875)$.

Whilst part (b) was a routine request, too many candidates equated $\dfrac{45-40}{\sigma}$ to 0.12, 0.88 or even 0.54776, rather than 1.175 from Table 4, and so lost 3 of the 4 marks. Those candidates who used a value between 1.17 and 1.18 invariably scored 4 marks. In part (c), many candidates failed to score marks by basing their decision on means and standard deviations rather than on their calculated and given probabilities. Those who did use the latter invariably came to the correct decision, even if it was stated as Route Y rather than Route B. In part (d), weaker candidates simply standardised 20 using 18 and 12 and so scored at most 1 mark. The majority of those candidates who realised that $SE\left(\overline{W}\right) = \dfrac{12}{\sqrt{36}}$ often scored full marks, though a small minority quoted 0.841 instead of 0.159 as their final answer. In part (e), a considerable number of candidates, including some of those who had scored full marks in part (d), stated that they had not used the Central Limit Theorem as the samples had been large!

Question 7

This proved to be a straightforward question for many candidates, with only part (c) causing a significant number of candidates any difficulty. As a result, marks below 10 were very rare. In part (a), apart from occasional slips on individual points, plots were accurate. Almost all candidates found accurate values for the slope b and intercept a by using the statistical functions on their calculators but a minority quoted b to only 2 significant figures. This unreasonably premature approximation lost a mark here and, through a knock-on effect, some accuracy marks in subsequent parts of the question. A number of candidates continued to find

values for b and a using a formula approach and in most cases were successful, however they perhaps penalised themselves as regards time available for other questions.

Most lines were plotted accurately although there was often little, if any, evidence of method. In part (c), most candidates correctly attempted to calculate the predicted value of y for $x = 480$. Some then failed to turn this into a residual or had a sign error. A small minority quoted the value of the product moment correlation coefficient, perhaps through confusing r with r_i. Even the better candidates often omitted to make any subsequent comment or relate their result to their scatter diagram. Answers to part (d) were generally most impressive with most candidates scoring full marks through use of their equation, scatter diagram or even a proportion argument. Those candidates who had used premature approximation in part (b) sometimes produced answers outside the acceptable limits. A small minority of candidates considered that Stan's charge would be $80 \times £12 = £960$.

Mark Ranges and Award of Grades

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