Version 1.0

General Certificate of Education (A-level)
June 2011

Mathematics MS/SS1A

(Specification 6380)

Statistics 1A

Report on the Examination

Further copies of this Report on the Examination are available from: aqa.org.uk

Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales (company number 3644723) and a registered charity (registered charity number 1073334).
Registered address: AQA, Devas Street, Manchester M15 6EX.

Written Component

General

It is disappointing to report that the overall level of achievement on this paper was far below that expected and well below the comparative standard achieved by candidates on those questions in common with MS/SS1B. No candidate scored above 50 (out of 60) marks with nearly half achieving less than 40%. This was a sad reflection on the abilities of candidates entered for this paper.

The use of calculators, mostly in questions 1 and 6, was appropriate as was the use of tables in answering questions 2 and 5. Many candidates also needed to be better aware that the phrase 'Show that ...' required a complete set of convincing steps. For example, in question 4(c)(i), the frequently seen general statement 'J and W are not mutually exclusive as they can occur together' gained no mark.

Question 1

A reasonable number of candidates obtained the correct values for the mode, median and interquartile range. Some candidates even obtained an answer for the mean within the range permitted, but very few scored the 2 marks for the standard deviation. It was evident that most candidates were unsure as to how to treat grouped data with the result that they probably used incorrect mid-points, but the absence of any detail made this uncertain.

Of even more concern was the number of candidates who failed to use the frequencies, particularly when calculating the standard deviation. Calculating the mean and the standard deviation from a frequency distribution or from a grouped frequency distribution must be bread and butter to candidates entered for this paper. Disappointingly, most candidates apparently had no clue as to what was meant by 'measure of spread'. In fact 'mode', 'median', 'mean', 'bar chart', 'histogram', etc were seen with varying frequencies. It should be noted that the standard responses of 'mean and standard deviation' or 'median and interquartile range' also scored no marks.

Question 2

Most candidates made either a fully correct or sound attempt at part (a) and it was pleasing to see the marked absence of attempted continuity corrections or the use of $\sqrt{2.5}$ or 2.5^2 in standardising. However, a noticeable number of candidates failed to make the necessary area change and so found $\mathrm{P}(W < 162)$. There were many correct answers to part (b), although some valid attempts were spoilt by finding p^6 instead of p^{12}: something that was requested on a previous paper! Answers to part (c) were often poor with many worthless attempts, this despite similar requests on previous papers. Perhaps not surprisingly, many candidates stated 2.3263 instead of 2.5758 as the z-value. However, most candidates were unable to equate their z-value to $\left(\frac{170-165}{\sigma}\right)$. Of the minority who did, very few indeed appeared capable of solving the resultant equation for σ: a sad reflection on their algebraic skills.

Question 3

It was of concern to see the large proportion of weak answers to this question, particularly as the topic has been examined in a similar way on all previous papers. The construction of the 96% confidence interval caused problems for far too many candidates. Common errors were an incorrect z-value (often 1.7507); use of 251 or 250 for $\bar{x}$; use of 1.92, $\sqrt{1.94}$, 1.94^2 or

even 184.5 for s. Those few candidates who had obtained a correct answer in part (a)(i) then struggled in part (a)(ii) by failing to clearly compare 250 (the words 'it' or 'mean' were not acceptable) with their confidence interval in order to comment on the manufacturer's claim. Some stated incorrectly that their interval contained 250 whilst others stated that the claim was false since their interval did not contain 250. Answers to part (b)(i) rarely scored marks due to candidates failing to recognise that it required a repeat of part (a)(i) with $n = 1$. As a result, only the very best candidates were able to gain the mark in part (b)(ii).

Question 4

As expected, it was rare to find an incorrect completion of the table in part (a). Although most candidates identified the correct probabilities of 0.10 and 0.15 in part (b), many then multiplied these two values instead of adding them, or obtained 0.80 from $0.70 + 0.65 – 0.55$. Showing justifications of the two statements in part (c) proved too challenging to most candidates, with no attempt or general prose being the most common responses, rather than the necessary numerical justifications. In fact, it was clearly evident from the overall responses that most candidates had little knowledge of, or were confused about, the terms 'mutually exclusive' and 'independent'. Whilst some candidates used $\mathrm{P}(W \cap J) = 0.55$ to show non–mutually exclusive, very few indeed achieved any marks for justifying non-independence.

Question 5

This question produced a good range of marks, with most candidates scoring some marks in all parts. By far the most common and rewarding approach was to use tables as was intended. Candidates showed a good understanding of what was required, although there was the usual confusion of interpreting the requests and tables in terms of $<$, $\leq$, $>$ and $\geq$. This was particularly evident in part (a)(ii), where the common incorrect answer was $1 – 0.8202$, and in part (a)(iii), where $[0.9986 – 0.5443]$ or $[0.9901 – (1 – 0.5443)]$ were often seen. However, such errors were much less in evidence in part (b), with many candidates scoring most, and often all, of the 5 marks available. In part (c), most candidates used $n = 50$ instead of $n = 500$. Such candidates often scored 1 mark for the two follow-through answers of 7.5 and 6.375.

Question 6

Most candidates were much better prepared for part (c) than for parts (a) and (b). In part (a), most candidates recognised that weight could be expected to increase with volume but then did not interpret in context the values obtained by Ryan and Sunil. A minority of candidates merely commented on the fact that the values were different or cast doubts on the competence of the two trainees! Again in part (b), candidates struggled to give answers of sufficient clarity. There was a lack of certainty of the effect on r of measurements being made in different units. All too often, vague statements such as 'will generally not effect', 'will make little difference' or 'it doesn't matter' were presented.

Similarly, many comments about the effect of sample size were vague, with many candidates referencing accuracy or reliability or merely stating that 'halving the sample size does not half the value of r'. Usually only the best candidates noted that $2 \times 0.612 = 1.224 > 1$ which was impossible since $-1 \leq r \leq 1$. Almost all candidates found the correct value of r in part (c), usually by use of the appropriate statistical function on their calculators. Most candidates then made a statement of interpretation relating to the variables of volume and weight by name. However many candidates included the word 'strong' whilst others omitted the word 'positive'. As a result, many candidates scored only 1 of the final 2 marks.

Coursework Component

The work submitted at this session was sent in the appropriate stationery and there were virtually no addition/transcription errors.

As mentioned in previous reports, it is important that all centres read the advice offered on the feedback forms carefully; in particular if the form indicates that the centre is close to/outside tolerance, as the advice given will help the centre to re-align their standards.

There were some examples of centres marking a little leniently, some of which were outside the tolerance allowed; it seemed that some scripts moderated were being assessed either by the preconceived idea of the abilities of the candidates or by the overall feel of the scripts, rather than by a meeting of the marking criteria. This led to some inconsistencies in the marking, and some quite short pieces of work lacked the depth of discussion and analysis for the marks they were awarded.

In Strand 1, how the sampling is done is allocated 6 marks, so it is important that candidates do justice to this in the depth of their discussion. If a particular non-random, but practicable, method is chosen, this must be discussed in the context of their task.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results statistics page of the AQA Website. UMS conversion calculator www.aqa.org.uk/umsconversion