Version

General Certificate of Education (A-level)
June 2011

Mathematics MS03

(Specification 6360)

Statistics 3

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.

General

It was disappointing to see the decrease in the number of candidates taking this paper as compared with June 2010. However, on a positive note, almost all of those entered were well prepared, often for all of the topics examined, with the result that the overall performance was much improved over that of last year and more in line with that in 2008 and 2009. Of particular note was the minimal number of candidates unable to obtain at least a pass grade together with the fact that almost half were able to obtain the highest grades.

Question 1

Most candidates knew what was required in part (a), but too many lost marks through unnecessary inaccuracies. In particular, the use of $\hat{p}$ was not acceptable in hypotheses and $p = 0.25$, rather than $\hat{p} = 0.288$, should have been used in the denominator of the test statistic. Each of these mistakes lost 1 mark. Almost all candidates scored the mark in part (b).

Question 2

Many candidates were unsure of how to move from 108 in 13 weeks to weekly, a problem that has been highlighted in previous reports. The easiest approach here was to evaluate $108 \pm 2.3263\sqrt{108}$ and then divide each of the resultant confidence limits by 13. The alternative correct approach was to consider $\bar{x} \pm z\sqrt{\frac{\bar{x}}{n}} = \frac{108}{13} \pm 2.3263\sqrt{\frac{108}{13^2}}$. However, all too often this approach resulted in the use of $108 \pm 2.3263\sqrt{\frac{108}{13}}$ or $\frac{108}{13} \pm 2.3263\sqrt{\frac{108}{13}}$. Such incorrect attempts lost at least 2 of the 5 marks available.

Follow-through answers in part (b) were generally sound, with candidates comparing 7 with their confidence limits or comparing 1 with their confidence limits divided by 7.

Question 3

Answers to this probability question were much improved over comparable questions on the same topic in recent papers. Although incorrect answers to part (a)(i) were not unusual ($0.15\times0.4 + 0.15\times0.75 + 0.15\times1 = 0.3225$), most candidates scored a large majority of the remaining 6 marks in part (a), with only a small minority failing to consider conditional probability in part (a)(iv). Most candidates then made the correct connection between part (a)(iv) and part (b)(i). It was pleasing to see the significant proportion of candidates who then realised the step for part (b)(ii), with the result that the awarding of full marks in part (b) was not uncommon.

Question 4

This was another very well answered question, with the majority of candidates scoring full marks. One or two candidates struggled unsuccessfully to solve their correct equations, in terms of $\sqrt{n}$, for n, whilst a few others left their answers as 96 or indicated that, to the nearest 10, this was 90 instead of 100.

Question 5

Almost all candidates were able to state at least one assumption (random or independent) with many able to identify both. Candidates were generally aware of how to calculate the confidence interval with many obtaining the correct answer. Some candidates mistakenly

pooled the two sample proportions for use in estimating the variance of $\hat{p}_G - \hat{p}_H$, something that is incorrect, and so lost at least 3 marks.

Question 6

It was pleasing to note the proportion of candidates who answered part (a)(i) correctly without recourse to subterfuge! In answering part (a)(ii), a minority of candidates used $\mathrm{V}(X_1 - X_2) = \mathrm{V}(X_1) + \mathrm{V}(X_2)$ or could not cope correctly with $(-2)\times(-4600)$. Otherwise, answers were sound without being fully correct, as, almost without exception, candidates calculated $\mathrm{P}(X_1 - X_2 > 250)$ but failed to double their answers to take account of $\mathrm{P}(X_2 - X_1 > 250)$. There were many fully correct answers to part (b).

Question 7

Answers to part (a)(i) were generally on the right path if not entirely convincing, whereas most candidates provided a convincing answer in part (b)(ii). Also, it was very rare to see an incorrect answer to part (b)(i) but even rarer to see a correct reason in part (b)(ii), where the most common answer was 'λ too large', which, needless to say, did not score the mark.

Question 8

The awarding of full, or almost full, marks was the norm in part (a)(i), as was the 1 mark in part (a)(ii) where reference to 'large samples' was deemed just sufficient. A majority of candidates provided a valid deduction in part (b)(i), although erroneous reasoning resulting in the given result was both obvious and not uncommon. Whilst many candidates were aware of the definition of a Type II error, only the best candidates were able to apply it correctly to the given situation, often because the probability attempted was $\mathrm{P}\left(Z < \frac{80.63 - 125}{285}\right)$.

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