A-LEVEL
Mathematics

MS03 - Statistics 3
Report on the Examination

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General

The overall level of achievement was very similar to the average seen in past papers with the majority of candidates well prepared for the examination. There was both a reasonable proportion of high achievers and, pleasingly, a low proportion unworthy of a pass grade. Most candidates produced sufficient method to justify numerical answers and made appropriate use of their calculators' statistical functions and the supplied booklet of formulae and tables. One slightly worrying aspect was the apparent failure of some candidates to take careful note of information and requests within questions. Such candidates need to be aware that this can result in a major loss of marks.

Question 1

This first question provided all candidates with a solid start to the paper. Save for the odd exception, candidates used the three given totals correctly in part (a). In part (b), the use of r instead of ρ, in the hypotheses was too prevalent as was a stated 2-tailed critical value.

Question 2

Answers to part (a) were much improved on those for this topic in previous series. Nevertheless, there continued to be confusion as to whether to divide by 26 or 26^2 under the square root. It was apparent that the method used with most success was to first evaluate a confidence interval using $(507-416) \pm 2.5758\sqrt{923}$ and then to divide the results by 26. In part (b), marks were lost for phrases of the form '0 is not inside the CI' or '0 is outside the CI' since the belief required the equivalent of '0 is below the CI'.

Question 3

Candidates displayed a very good understanding of probability and of Bayes' Theorem and, as a result, the loss of any marks in part (a) was rare. In part (b), most candidates multiplied the three correct conditional probabilities but, all too often, final answers were spoilt through using a subsequent multiplier of 3 or 1 instead of 6.

Question 4

In part (a), the majority of candidates ignored or misunderstood the information in the first paragraph and so opted for $\mathrm{H}_0 : p_{\mathrm{UK}} = p_{\mathrm{USA}}$ instead of $\mathrm{H}_0 : p_{\mathrm{UK}} = 0.6$. This then led to errors in the test statistic where such candidates were forced into the incorrect assumption that $n_{\mathrm{USA}} = 250$. These errors resulted in a loss of at least four marks. Candidates also ignored the request 'Use an exact test ...' in part (b) choosing rather to use a normal approximation; a loss of four or more marks. However, there were many valid, if not fully correct, attempts in part (c). The most common errors were the use of an incorrect z-value or, more often, the use of a factor of 2; 'within 0.05' implies ± 0.05 and not ± 0.025.

Question 5

In answering part (a)(i), too many candidates tried to bluff a proof without adequate explanation. However answers to part (a)(ii) were much more convincing. Candidates usually scored full marks in parts (b)(i) & (ii) where, in the latter, correct reasoning suggesting that, as a result, $p < 0$ was the norm. In part(c), most candidates provided convincing reasoning for $\mathrm{E}(W) = \mathrm{Var}(W) = 20$ but then many gave no reason as to why W could not have a Poisson distribution. About 50% of candidates opted correctly to use $\mathrm{Po}(10)$ in part (c) and so often gained full marks. There was no reward for the remainder of candidates who attempted a normal approximation.

Question 6

In part (a), many candidates obtained $5\sigma^2$ from $L - 2S$ rather than the required $\frac{5\sigma^2}{n}$. Following worthless hypotheses in part (b)(i) usually involving L and $2S$ or $\bar{L}$ and $2\bar{S}$, it was pleasantly surprising that there often followed a correct test statistic, critical value and conclusion. There were also many sound deductions in part (b)(ii) which, again surprisingly, were followed by an impressive proportion of candidates scoring the final four marks for what was thought to be a demanding finale to the paper.

Mark Ranges and Award of Grades

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

Converting Marks into UMS marks

Convert raw marks into Uniform Mark Scale (UMS) marks by using the link below.

UMS conversion calculator