Course report 2019

Subject	Statistics
Level	Advanced Higher

This report provides information on candidates' performance. Teachers, lecturers and assessors may find it useful when preparing candidates for future assessment. The report is intended to be constructive and informative and to promote better understanding. It would be helpful to read this report in conjunction with the published assessment documents and marking instructions.

The statistics used in this report have been compiled before the completion of any post-results services.

Section 1: comments on the assessment

The question paper was accessible to the majority of candidates. Feedback suggests that it gave candidates a good opportunity to demonstrate the breadth and depth of their knowledge of the subject at this level.

The majority of candidates made a reasonable attempt at all the questions and candidates appeared to have sufficient time to finish the paper.

Question 7 was less demanding than expected, and questions 4 and 9 were more demanding than expected. The overall level of demand was more than anticipated. The grade boundary was adjusted to take account of this.

Many candidates did not gain full marks in some questions by not paying enough attention to the detail of what was being asked. For example, question 4 was about the influence of scoring the first goal in a match — not a comparison of the performance of two teams.

Section 2: comments on candidate performance

Areas that candidates performed well in

Question 1   Poisson distribution

Question 2(c)   Chi-squared test

Question 5   Rectangular distribution and the Central Limit Theorem

Question 6   Confidence intervals

Question 7   Control charts

Question 10(a)   *z*-test

Question 11(a)(b)   Probability theory

Areas that candidates found demanding

Question 2(b)   **Independent events**
                          Very few candidates appeared to know how to show that two events
                          are statistically independent.

Question 3   **Sampling methods**
                          Candidates did not express themselves precisely and accurately and
                          many did not appreciate that the sampling in part (a) was not
                          random.

Question 4   **Proportion test**
Most candidates failed to read the question carefully and addressed the wrong issue (see above).

Question 8(b)(d)   **Bivariate analysis**
Many candidates could not clearly explain what the coefficient of determination actually measures. Very few suggested a residual plot and what it could reveal.

Question 9   **Wilcoxon test**
Many candidates could not cope with a zero difference, a normal approximation, a continuity correction and the underlying assumption of the test, all in the same analysis.

Question 10(b)   ***t*-test**
Most candidates struggled with the more algebraic nature of this part of the question.

Question 11(c)   **Bayes Theorem**
Many candidates could not deal with one instructor having twice as many learners as the other.

Question 12(b)   **Laws of variance**
A high number of candidates are still confusing $\mathrm{V}(60X+45Y)$ with $60\,\mathrm{V}(X)+45\,\mathrm{V}(Y)$

Section 3: preparing candidates for future assessment

The observations in the previous section and those below will help teachers and lecturers to prepare future candidates. Many of the areas have been commented on in previous course reports.

As the tables supplied for this course are to four decimal places, teachers and lecturers should remind candidates to quote probabilities to that level, or as exact fractions where appropriate.

Candidates need to write clear and accurate descriptions and comments. This is particularly important when describing sampling methods, for example in question 3 where it is easy to fall into traps such as 'a 4% sample equates to sampling every fourth book'. The descriptions of systematic sampling were typically vague. Markers observed other examples of lack of clarity in the attempts to explain what is measured by the coefficient of determination, and what one would hope to see in a residual plot.

Candidates need to read the questions carefully so they can decide what the questions are asking for (for example, question 4). Candidates need to practise answering clearly within the context of the question.

Specifically, candidates need to be prepared in:

♦ selecting the most appropriate test to fit a given scenario, for example parametric or non-parametric, one-sample or two-sample, paired data or independent samples, z-test or t-test
♦ choosing the correct critical value from the tables, for example 1-tail or 2-tail
♦ knowing when and when not to use a continuity correction
♦ knowing when to use a standard error rather than a standard deviation
♦ writing in the context of the given scenario, for example the last sentence of questions 2 and 12, and the majority of responses where candidates were asked about the assumptions underlying a process

Grade boundary and statistical information:

Statistical information: update on courses

Number of resulted entries in 2018	186

Number of resulted entries in 2019	212

Statistical information: performance of candidates

Distribution of course awards including grade boundaries

Distribution of course awards	Percentage	Cumulative %	Number of candidates	Lowest mark
Maximum mark				
A	33.0%	33.0%	70	64
B	27.8%	60.8%	59	54
C	17.0%	77.8%	36	45
D	5.7%	83.5%	12	40
No award	16.5%	-	35	-

General commentary on grade boundaries

SQA's main aim is to be fair to candidates across all subjects and all levels and maintain comparable standards across the years, even as arrangements evolve and change.

SQA aims to set examinations and create marking instructions that allow:

♦ a competent candidate to score a minimum of 50% of the available marks (the notional C boundary)
♦ a well-prepared, very competent candidate to score at least 70% of the available marks (the notional A boundary)

It is very challenging to get the standard on target every year, in every subject at every level.

Therefore, SQA holds a grade boundary meeting every year for each subject at each level to bring together all the information available (statistical and judgemental). The principal assessor and SQA qualifications manager meet with the relevant SQA head of service and statistician to discuss the evidence and make decisions. Members of the SQA management team chair these meetings. SQA can adjust the grade boundaries as a result of the meetings. This allows the pass rate to be unaffected in circumstances where there is evidence that the question paper has been more, or less, challenging than usual.

♦ The grade boundaries can be adjusted downwards if there is evidence that the question paper is more challenging than usual.
♦ The grade boundaries can be adjusted upwards if there is evidence that the exam is less challenging than usual.
♦ Where standards are comparable to previous years, similar grade boundaries are maintained.

Grade boundaries from question papers in the same subject at the same level tend to be marginally different year to year. This is because the particular questions, and the mix of questions, are different. This is also the case for question papers set by centres. If SQA alters a boundary, this does not mean that centres should necessarily alter their boundary in the question papers that they set themselves.