NZQA
New Zealand Qualifications Authority
Mana Tohu Matauranga O Aotearoa

Assessment Report

New Zealand Scholarship
Statistics 2016

Standard 93201

Part A: Commentary

Overall the standard of the candidates' answers was similar to 2015. The best answered questions were Q3 and Q4 where 47% and 48% of candidates respectively achieved scholarship standard. In Q3, 27% of candidates achieved outstanding standard. The most difficult question was Q5 where only 22% achieved scholarship standard.

The percentage breakdown of candidates reaching both a scholarship standard (S) and an outstanding scholarship standard (O) per question is shown in Table 1 below:

Question		1	2	3	4	5
Grade	S	31.7	19.6	19.6	36.3	17.4
	O	8.1	5.6	27.0	11.3	4.3

Table 1: Percentage Breakdown of Grade per Question (S: 5 or 6 marks, O: 7 or 8 marks)

Part B: Report on performance standard

Candidates who were awarded **Scholarship with Outstanding performance** commonly:

- identified the need for a representative sample in order to obtain statistics for effective estimation
- knew in detail how to establish the validity of a forecast
- described fully an experiment, in detail, through to the analysis stage
- accurately described an experiment with all its key elements
- understood the difference between a mean and a median, the value of percentages versus raw data and a sample versus a population census
- discussed confidence intervals, bootstrap distribution and re-randomisation clearly knowing what was appropriate to the question
- clearly identified appropriate probability distributions and their underlying assumptions

- selected probability distributions that fitted the data provided and built a model along with calculating and discussing the relative fit of these distributions
- used proportions, both in comparing time series graphs and in comparisons between countries
- computed interval predictions for time series values in the future
- suggested possible reasons for changes in time series graphs
- linked their answers with the purpose and themes of the questions
- showed a sound understanding of statistical terminology and the importance of backing their comments with evidence
- wrote fluently, succinctly and in context.

Candidates who were awarded **Scholarship** commonly:

- discussed trend and seasonality of a given data set and made comparisons with data but not necessarily with percentages
- compared bi-variate graphs with respect to correlation and outliers
- provided evidence for the validity of a prediction
- interpreted correctly the output for a randomisation test
- knew about setting up an experiment

- in Question Three selected the appropriate distribution and calculated the required probability correctly
- correctly discussed the differences between a series of Time Series graphs
- recognised and considered the model for the normal and triangular distributions for fitting a set of data
- identified seasonal effects in context from Time Series data
- justified reasons for randomisation and also formed correct conclusions from the output
- showed a reasonable understanding of statistics but often failed to fully relate their answers to the question
- wrote in context and were successful in linking statistical concepts
- deduced a good range of observations from a series of graphs
- described some information contained in a graph in context but often omitted details like values and dates.

Other candidates commonly:

- did not use "linear" in their description of correlation
- did not know the characteristics of a sample
- did not understand how to justify validity in a regression prediction
- described the use of a "control group" and "treatment group" rather than pre- and post-tests results
- did not read the question carefully hence they went on to discuss two different teaching methods in Q2 rather than a single teaching method
- missed out referring to the mean when discussing differences in test scores and consequently did not make a correct inference about the size of the difference in mean scores. The confidence interval was interpreted incorrectly
- did not write a conclusion which captured all of the evidence given in the question

- were unable to calculate straightforward normal, binomial or triangular probabilities
- provided too much detail in describing time series where every up and down was described rather than the overall picture
- did not find and briefly discuss the salient features in a time series
- gave a year by year account of what happened and did not discuss the time series graph as a whole. The terminology used in their descriptions was poor. For example, "spikes" was freely used even though there were no spikes at all. Peaks and troughs were used even when there was no seasonality present. The actual values indicated by the graphs were frequently not mentioned at all. Vague statements of increases and decreases resulted
- thought that fluctuations meant there had to be seasonal or cyclic effects present
- did not provide dates, values and a description of the overall pattern including fluctuations for the three-time series graphs
- made vague descriptions of possible graphs in Q4. While some candidates could describe (in some way) a comparative bar graph they could not say why this would be a better graph
- did not make clear what they were doing in working out predictions for a time series. In many cases numbers came out of nowhere for calculations.
- gave only one generic vague comment about a prediction when other evidence was present in the paper
- named contributing factor(s) to obtaining representative data but were unable to provide an explanation. Candidates also used vague language describing things which were not factors, such as they should be "geographically representative" or that the weather stations "should be spread evenly across the country" and "should not be close together".
- wrote long passages speculating why something might have happened rather than describing what information was actually in the graph
- mixed up features for different types of statistical investigations. For instance, they wrote about relationships in Time Series and trends in Bivariate.
- typically repeated their observations. Many didn't compare gradients in Q5 which was a key concept in comparing between NZ/Antarctica/Global of the rate of temperature change.
- made statements that were generally vague with no supporting data and did not state where they were referring to
- confused terminology and lacked context
- often did not write totally clear concise statements backed up by evidence.

Further comments

There was evidence that some candidates failed to use their basic statistical knowledge and were not familiar with statistics at Levels 1 and 2 especially when working with graphs, tables and probability distributions.

Many candidates had difficulty writing clear and articulate answers.

There was a general lack of rigour in candidates' writing. Students are advised to check read what they have written.

Many candidates did not start each question on a new page despite the instruction at the top of each page.

Several answers were devoid of context along with statistical concepts not being clearly articulated.

Subject page

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