

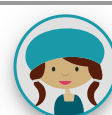
Assessment Report

New Zealand Scholarship Statistics 2022

Standard 93201

Part A: Commentary

Candidates must demonstrate a broad understanding of achievement objectives from across the Statistics strand of the curriculum up to and including Level 8, including statistical concepts and skills assessed by the NCEA Level 3 Statistics Achievement Standards. Successful candidates appeared to draw on familiar learning experiences with topics to demonstrate a deep understanding of statistical ideas (e.g. practised writing reports about investigations), rather than relying on rote-learned memorisation of notes or answers to previous examination questions. Candidates who applied statistical thinking by integrating contextual knowledge into their responses performed well. However, candidates need to balance their responses to ensure statistical ideas are clearly communicated, and some candidates excessively discussed context at the expense of communicating statistical knowledge. Candidates need to be familiar with a range of statistical graphs, outputs, and other data-based visualisations, including tables. Beyond the information provided in the question related to these statistical representations, candidates should spend time familiarising themselves with the labels and scales provided (e.g. the y-axis) and any legends or annotations and considering the nature of the data used.



The examination included four questions of which candidates were required to respond to all four. The questions covered the requirements of the 2022 assessment specification which were that questions would use real-life contexts, be set in the areas of statistics investigations, statistical literacy, and probability, cover content from more than one area, and have an emphasis on data analysis and interpretation. Data was presented in a variety of ways, using familiar and some unfamiliar representations, and candidates were required to interpret features of the data in context. Each of the questions required an integration of statistical concepts rather than standalone topics.

It was evident that candidates who had carried out investigations using the range of data and methods expected for this subject, and had practised writing reports about these investigations, were able to confidently engage with concepts assessed in the exam. This was particularly evident in Question Two, which required candidates to flexibly adapt their critical thinking with respect to designing and conducting an experiment.

Responses to Q4(c) did not consider the amount of data provided when assessing the suitability of a probability distribution model. Given the relatively small sample size ($n = 41$) and number of outcomes for the distribution, observed counts or proportions can be expected to vary from model-based counts or proportions. Most candidates used an approach of comparing model / theoretical to observed proportions, but at scholarship level, greater appreciation of sampling variation was needed.

Part B: Report on performance standard

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

- synthesised information from different sources (graphs, tables, and text) and made insightful connections to the context, rather than making isolated comments
- compared quantities / proportions / probabilities using a relative calculation
- demonstrated understanding of the structure of statistical models and could discuss what might influence these models using highly sophisticated statistical language

- reasoned with an unfamiliar representation (e.g. an Eikosogram) as part of calculating conditional probabilities
- reflected on the nature of the data and model appropriateness, e.g. considering whether experimental groups are independent, and therefore what the appropriate analysis method required
- considered factors that might affect data, such as the need for controls and the appropriateness.

Candidates who were awarded **Scholarship** commonly:

- linked their key features of graphs to the context, provided numerical evidence, and used appropriate units when producing written reports
- created appropriate confidence intervals from correct margin of error calculations
- used confidence intervals to make an inference about a population parameter, rather than just using the sample statistic
- demonstrated understanding of the conceptual differences between bootstrapping and randomisation
- recognised the need for random allocation to treatment groups in experimental design
- demonstrated knowledge of various statistical models and could apply them in context
- were familiar with key aspects of experimental design, and could identify specifics from the context
- indicated they had experience with applying experimental design principles to carry out experiments and analyse data
- applied conditions for probability distributions and reflected on whether they were met in the specific context
- understood the key features of the Holt-Winters model for forecasts and could consider whether it was appropriate given the features of the data.

Other candidates

Candidates who were **not** awarded Scholarship commonly:

- did not read graph labels or questions carefully

- provided descriptions about graphs but did not refer to numeric evidence
 - provided generic descriptions or memorised answers to questions, rather than providing examples or specific contextual links
 - described every little movement on a time series graph, and did not identify the key features
 - did not link the key features of time series data to the appropriateness of different statistical models for forecasts
 - provided general non-sampling errors when asked specifically about the representativeness of a sample
 - did not demonstrate understanding of experiment design principles, or knew only one experiment design
 - did not adequately describe, in context, how to design an experiment
 - suggested bootstrapping or other sample to population inference techniques for experimental data
 - stated that a constant mean for the Poisson distribution meant seeing the same count of events each year.
-

[Subject page](#)

Previous years' reports

 [2021](#)

 [2020](#)

 [2019](#)

 [2018](#)

 [2017](#)

