NZQA
New Zealand Qualifications Authority
Mana Tohu Matauranga O Aotearoa

Assessment Report

New Zealand Scholarship
Calculus 2018

Standard 93202

Part A: Commentary

Successful candidates in 2018 were well prepared and had a sound grasp of both the fundamental mathematical skills required at this level as well as skills in problem solving and worked to an acceptable level of accuracy. Candidates who gained Scholarship with Outstanding Performance possessed mastery of the knowledge embodied within all the Mathematics Learning Objectives underpinning the Scholarship paper; were able to clearly establish a strategy to solve a problem as well as communicate that strategy through well developed and laid out solutions; utilise rigorous and correct mathematics to a high and exacting standard.

Some unsuccessful candidates were let down by the poor layout of their solutions which they struggled to bring to closure, having lost their way somewhere within a self-created maze. Many of these candidates lost valuable time pursuing false arguments rather than either reflecting upon their strategy and redirecting their effort or moving on to another question. Others possessed a very restricted knowledge of the topics spanned by the Scholarship examination. Candidates need to be made aware of the requirements of Scholarship Calculus and especially the assessment specifications.

Successful candidates were able to integrate their knowledge for the development of correct solutions to problems. While some of the questions tested narrowly defined skills pertinent to one or two Learning Objectives, many required students to draw on knowledge from multiple areas of the curriculum. Students who were able to do this, and successfully interlace these skills and knowledge, certainly earned the higher grades.

Part B: Report on performance standard

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

- understood and were proficient in the general discipline of mathematical proof
- proved a trigonometric identity with clear setting out and flair
- had a broad mathematics vocabulary at their disposal
- established a mathematical model to solve problems within an unfamiliar context
- established a differential equation involving related rates of change and then solved the equation by separating the variables
- solved non-linear systems of equations using elegant algebra and often useful substitutions
- understood the domains and ranges of logarithmic functions
- manipulated complicated algebraic expressions in exact form
- laid out their working logically and clearly throughout the assessment
- established strategies upon which to build their solutions rather than charge blindly into opportunistic algebraic routines
- integrated skills and knowledge from multiple Learning Objectives in the curriculum to develop successful solutions.

Candidates who were awarded **Scholarship** commonly:

- manipulated trigonometric expressions using basic identities
- determined the integrals of functions using the substitution method
- generalised a pattern beyond its initial terms
- considered the relevance of a domain restriction when solving problems
- applied similar triangle relationships correctly to establish patterns

- manipulated and rearranged multi-term equations and expressions correctly
- established optimisation problems by forming an algebraic function and differentiating it to find its minimum
- rationalised complex numbers correctly.

Other candidates

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

- possessed little or no understanding of the meaning of mathematical proof
- failed to deploy fundamental algebraic skills such as factorisation and expansion when manipulating expressions involving trigonometric terms
- showed little understanding of related rates of change
- were unfamiliar with the definition of the logarithm
- were unable to change from logarithmic to exponential form
- were unfamiliar with the algebraic laws of logarithms
- were deficient in the vocabulary of mathematics
- were unaware of the definition of a function
- lacked understanding about the domain of a function
- could not differentiate a function implicitly
- lacked the ability to assess the validity of their answers to real life problems
- oversimplified or trivialised problems
- made careless algebraic errors
- were incompetent in solving rational equations
- falsely equated the real and imaginary parts of a complex number, z, to the reciprocals of the real and imaginary parts of z^{-1}
- were unable to solve simultaneous equations involving quadratic terms
- were unable to solve an integral using a simple substitution
- produced multiple answers when asked for a point of tangency
- misunderstand the concept of discontinuous function
- attempted to bluster their way through proofs rather than find their minor algebraic errors.

Subject page

Previous years' reports (PDF, 189KB)
2016 (PDF, 189KB)

2017 (PDF, 40KB)
