NZQA
New Zealand Qualifications Authority
Mana Tohu Matauranga O Aotearoa

Assessment Report

New Zealand Scholarship
Calculus 2016

Standard 93202

Part A: Commentary

If viewed holistically, New Zealand should be encouraged by the number of candidates enrolling for scholarship calculus and displaying evidence of their best efforts.

Some candidates demonstrated elegant, creative problem solving strategies with disciplined presentation. There were a few scripts, however, where very little was attempted; many other scripts with prolific but incorrect working; and some scripts with correct working that was crossed out. This suggests that some candidates approached problems with a limited toolset of algorithmic routines. In some cases there was little evidence of problem analysis, deconstruction, solution strategy and subsequent implementation.

Part B: Report on performance standard

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

- showed evidence of problem analysis and establishing a strategy before commencing any algebraic manipulation
- checked the validity of their answers and knew when to persevere and when to abandon a failed strategy
- laid out their working in a logical and clear manner throughout the paper
- integrated accurately using trigonometric identities
- showed excellent algebraic manipulation skills with elegance and a sense of direction - such as using a change of base while manipulating logarithmic expressions
- generalised a pattern beyond its initial terms
- were confident in the manipulation of factorials
- knew how to work out exact values
- knew the relationship between the sum of roots and the coefficients of the equation
- applied knowledge across different strands of the curriculum.

Candidates who were awarded **Scholarship** commonly:

- showed competency in their algebraic skills
- used appropriate trigonometric identities to simplify problems such as definite integrals
- linked diagrams to problems effectively
- demonstrated good use of integration and differentiation skills and were able to use the relationship between them both to find the equation of a curve.
- formed linear constraints correctly from a text based problem.

Other candidates commonly:

- did not identify the correct relationship that a question was asking them to analyse, for example; finding a maximum or minimum of the wrong function; using trigonometric identities that had no bearing on the problem
- demonstrated a significant deficit in general algebraic manipulation skills
- demonstrated a deficit in manipulating expressions involving logarithms and indices
- were unable to implicitly differentiate an expression
- were unable to determine whether to differentiate or integrate an expression to solve problems
- avoided working in exact form when the problem involved trigonometric expressions
- did not include the integration constant when solving a differential equation
- trivialised the problem and often were unable to generalise beyond a specific case
- used the differentiation product and quotient rule incorrectly
- commanded a very limited knowledge of level I Euclidean geometry.

Further comments

The cohort did not produce convincing evidence to suggest strong collective competency in any one of the standards. However, the standard where the best group performance was demonstrated, relative to the other standards, was AS91578 (Apply differentiation methods in solving problems).

Conversely, there were two achievement standards in which performance of the cohort was particularly weak. These were:

AS91579 (Apply integration methods in solving problems): many candidates were unable to identify a differential equation and had little idea about the notion of anti-differentiation. Furthermore, few candidates understood the meaning of an “integration interval”.

It appears that skills and knowledge associated with AS91573 (Apply the geometry of conic sections in solving problems) were studied by only a few 2016 scholarship candidates.

Subject page
