2023 NCEA Assessment Report

Subject: Mathematics and Statistics (RAS)

Level: Level 1

Achievement standard(s):   91946, 91947

General commentary

These assessments were completed as part of the pilot programme for mathematics and statistics in 2023. For 2024 candidates and teachers should refer to the most recent version of the achievement standards and the external assessment specifications on the NZQA website. The assessment is aimed at Level 6 of the New Zealand curriculum, however, knowledge and understanding of the lower levels of the curriculum is expected.

Report on individual achievement standard(s)

Achievement standard 91946: Interpret and apply mathematical and statistical information in context

Assessment

Candidates were required to compose a report, using the Resource Booklet provided for them, and with the guidance of the prompt questions.

Candidates were given three hours to individually produce their report. Individual schools could determine when the assessment was completed and teachers were required to ensure authenticity of candidates' work.

Commentary

Candidates were required to use the prompt questions to help them structure their report. By responding to each of the prompt questions candidates were guided to meet the requirements of the standard.

Candidates needed to engage with the information in the prompt questions carefully so that they provided the expected and required evidence.

E.g. Section A / bullet point #4: the prompt question asked "how should a household choose …" whereas some candidates focussed on "which electricity provider to recommend".

The examiner was impressed by the high-quality responses provided by many of the candidates.

Candidates are encouraged to research various aspects related to the resources provided for them in the Resource Booklet.

The final bullet point in both Section A and Section B encouraged the candidate to display abstract thinking, whilst discussing any assumptions and limitations. This could include personal worldviews.

Grade awarding

Candidates who were awarded **Achievement** commonly:

*   provided answers to the prompt questions with generalised statements that were not justified with reference to the resource materials
*   provided valid responses for section A, but did not respond with substance to Section B
*   interpreted basic information from charts and graphs, but did not express their response in a coherent manner
*   relied only on one resource to substantiate statement made.

Candidates who were awarded **Achievement with Merit** commonly:

*   provided detailed answers using the evidence provided in the resource booklet, and justified the responses to the prompts
*   compared and commented upon the prices of electricity for homes and businesses
*   displayed quantitative evidence to support their conclusions
*   provided supporting evidence from the Resource Booklet to identify the required aspects
*   provided answers to the prompt questions with generalised statements and explanations.

Candidates who were awarded **Achievement with Excellence** commonly:

*   provided detailed answers to the prompt questions, including consideration of limitations
*   provided detailed answers to the prompt questions, including reflection on the assumptions
*   provided detailed answers to the prompt questions, including reflections on their own experiences and viewpoints, giving greater depth to their responses
*   thoroughly understood the resources provided for them
*   carried out background research into the context
*   demonstrated high levels of thinking and statistical understanding and insight.

Candidates who were awarded **Not Achieved** commonly:

*   found difficulty in interpreting the resources provided
*   did not use the prompts provided in the question booklet
*   did not provide sufficient evidence to satisfy the minimum requirements of this Achievement Standard
*   used incorrect units and incorrect references to the variable graphed in the resource booklet
*   answered the prompts by using their own knowledge and without using the features provided in the graphs in the resource booklet.

Achievement standard 91947: Demonstrate mathematical reasoning

Assessment

The examination content was based on Level 6 of the New Zealand curriculum and the achievement standard. It should be noted, however, that knowledge and understanding from the lower levels of the curriculum may be used as a basis of problems within this assessment.

The standard covers a broad range of content which cannot be completely assessed in each iteration of the examination. The blend and proportions between the various facets of the achievement standard will deliberately change from year to year. Candidates and teachers need to be aware, however, that the knowledge and understanding of the entire Achievement Standard is expected.

Candidates need to follow the instructions in the question.

E.g. "using your graphs" means that algebraic solutions are not expected or rewarded; "use algebra, supporting your answer with full mathematical working" means that accessing various possible components on a graphical calculator will not be rewarded without sufficient evidence of the necessary algebraic methods. Candidates will often be guided towards which method to be utilised when solving a problem. This guidance must be followed and will be consistent with "demonstrating

mathematical reasoning".

Each examination will be made up of three questions, and each question may have only one opportunity for Excellence. Questions will have multiple parts. Opportunities for Merit and Excellence will be spread through the examination. As a result, the parts of a question may not be arranged in increasing order of difficulty.

This assessment required a candidate to be familiar with a wide range of methods and procedures. A combination of these methods and procedures may be required in any part of a question and for the award of any level of achievement. Linking these provides evidence of relational and abstract thinking.

Commentary

The questions were scaffolded to assist in the candidates' progress towards the solution by providing a "show that …" style problem. This facilitates access to the remainder of the question if the candidate has been unsuccessful in the "show" aspect. It is expected that the candidate will then use the given value to approach the subsequent parts of the question.

Many students found Question Two (a)(iii) challenging to interpret and begin their solution. Those students who were able to show the necessary abstract thinking, were successful in following through the problem to a conclusion.

Candidates are expected to demonstrate an understanding of the mathematical concepts, rather than directly transferring results from a graphical calculator.

Candidates are encouraged to attempt as much of the examination as possible so that the assessor can identify relevant evidence to award credit.

Grade awarding

Candidates who were awarded **Achievement** commonly:

- substituted into a formula and correctly rounded the solution
- solved problems involving Pythagoras' Theorem
- solved problems using trigonometric methods and involving measurement
- demonstrated knowledge of basic geometric facts
- found the general equation for a linear pattern and a non linear pattern
- drew a parabola graph
- simplified a quadratic equation into three terms
- factorised a quadratic expression
- used the formula for calculating the area of a trapezium.

Candidates who were awarded **Achievement with Merit** commonly:

- found the surface area of a cylinder
- showed confidence working with angles and bearings using trigonometry
- found the area of an octagonal shape using trigonometry
- stated the length of a side of a triangle in algebraic terms of a variable
- used an algebraic method to solve a quadratic equation, with evidence of the algebraic method, relating to the intersection of two graphs
- drew a parabola graph accurately
- located the intersection points between a linear and parabola graph, with evidence of the graphical method, relating to the intersection of two graphs.

Candidates who were awarded **Achievement with Excellence** commonly:

- worked in the abstract and form algebraic generalisations
- applied Pythagoras' Theorem to solve a problem linking triangles and algebra
- determined accurately the point of intersection of a parabola and a linear function using a graphical method

- generalised calculations, involving volumes of cuboids and cylinders
- generalised the area and volume of a regular shape using trigonometry
- linked speed / distance / time problems and algebra
- solved a quadratic equation leading to the valid dimensions of a trapezium.

Candidates who were awarded **Not Achieved** commonly did not:

- round accurately
- accurately apply order of operations
- work with algebraic expressions
- evaluate problems involving volume
- solve problems involving bearings
- apply algebra in rate of change problems
- generalise the formula for area using algebra
.• find the general formula of a non-linear pattern
- accurately draw a parabola
- expand, rearrange and solve a quadratic equation.