2024 NCEA Assessment Report

Subject:	Mathematics and Statistics
Level:	1
Achievement standard(s):	91946, 91947

General commentary

The assessment for AS 91946 will change significantly for the 2025 round of external examinations. For 2025 candidates and teachers should refer to the most recent version of the achievement standard 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 are both necessary and 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 advised that three hours should be used to individually produce their report. Individual schools could determine when the assessment was completed, and teachers were required to ensure the authenticity of candidates' work, with reference to the NZQA Guidelines for assessment.

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 carefully with the information in the prompt questions so that they provided the required evidence.

The final bullet points in both Section A and Section B encouraged the candidates 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 sufficient detail to Section B
- interpreted basic information from charts and graphs but did not express their response in a coherent manner
- relied on only one resource to substantiate statements made
- identified trends in data displays
- extracted relevant information from the resources to make recommendations or support their opinion about the validity of given statements or whether they agreed or disagreed with given statements
- selected relevant information to make a comparison of one factor.

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
- 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
- described and interpreted a trend in a scatterplot graph
- used relevant information to identify multiple advantages / disadvantages and make comparisons of the two different telco companies
- supported their answers with calculations using information from the data displays
- made two statements / comparisons that were well-supported from the resources
- were able to interpret data in context to identify overall trends, assumptions, and draw insightful conclusions
- were able to calculate averages, ratios, and relative percentages using information from the graphs and the data provided.

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

- provided detailed answers to the prompt questions, including consideration of limitations, reflection on the assumptions, and including reflections on their own experiences and viewpoints, giving greater depth to their responses
- carried out background research into the context
- demonstrated high levels of thinking and statistical understanding and insight
- used and interpreted information from multiple resources to support their answers
- made three (or more) statements / comparisons that were well-supported from the resources
- demonstrated thorough understanding of Resource 4 and answered the question prompt with supporting information and calculations
- explained fully relevant limitations and assumptions made when using the resources to answer the question prompts
- justified their reasoning rigorously and provided comprehensive and well-structured explanations
- interpreted data critically, identifying complex patterns, and drawing sophisticated conclusions, assumptions, and limitations.

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

- demonstrated difficulty in interpreting the resources provided
- did not use the prompts provided in the question booklet
- 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
- demnstrated a misunderstanding of the question prompts and a misiterpretation of the resources
- did not provide sufficient evidence to satisfy the minimum requirements of this achievement standard.

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 contributing aspect of problems within this assessment.

The achievement 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 for the candidate to attain success.

Candidates need to follow the instructions in the question, for example:

- "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 utilise when solving a problem. This guidance must be followed and will be consistent with "demonstrating mathematical reasoning".

Each examination will be consist of three questions, and each question may have only one opportunity for Excellence. Each of the three questions will have multiple parts. Opportunities for Achieved, 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 and confident 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 value provided in the question to approach the subsequent parts of the question.

Generally, candidates showed strengths in the recognition and use of Pythagoras' Theorem and Trigonometry. However, it was disappointing that many students were not able to find the equation of a straight line.

Many students found Question Three, which required them to create a quadratic formula from a sequence given in a table, the most challenging. In this question they also had to recognise the features of a graph, without the graph itself drawn. Many students did not recognise the table would lead to a quadratic equation and a parabola graph which consequently led to Q 3 b) ii) being misinterpreted. The exponential equation in Q 3 d) elicited many common errors and misunderstandings with respect to the application of the rules of indices in solving a complex equation. Most students chose to solve the simultaneous equations using a graphical method instead of an algebraic method.

Candidates are expected to demonstrate an understanding of the mathematical concepts, rather than directly transferring results from a graphical calculator. An answer without appropriate working and justification will be marked as "Correct Answer Only" and will gain grade u, at best.

Those students who had strengths in all components of the achievement standard, particularly in Algebra, attained Merit or Excellence grades.

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
- made progress in finding the equation for a non-linear pattern
- simplified a quadratic equation into three terms and factorised a quadratic expression
- used the formula for calculating the area of a trapezium
- recognised and distinguished between perimeter and area of shapes
- formed and solved algebraically a linear equation to solve a perimeter problem
- calculated the area of basic shapes and the volume of basic objects
- found the equation of a straight line.

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

- showed confidence working with Pythagoras' Theorem and trigonometry and linking with geometrical rules
- found the area of an abstract parallelogram, using trigonometry
- found the area of a trapezium, giving the answer in terms of an unknown constant, k
- wrote the equation of a quadratic pattern
- identified at least three different features of a parabola graph, without the graph being drawn
- formed and rearranged an equation related to the perimeter of a triangle
- found the intersection of two straight lines, using either an algebraic method or an accurate graphical method
- applied Trigonometry and Pythagoras' Theorem to problems in three-dimensions
- calculated volumes within cylindrical tubes or cuboids
- displayed confidence in manipulating the rules of indices in solving an equation involving exponentials.

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

- worked in the abstract and formed algebraic generalisations
- worked with generalised calculations involving volumes of cuboids and cylinders
- found the radius of a sphere and relate this value to the comparison between the volumes inside cylinders and cuboids
- demonstrated abstract thinking whilst finding the volume of a three-dimensional trapezium and including solving an algebraic equation
- solved an equation involving exponentials, requiring various manipulations and rearrangements, and the use of the laws of indices
- communicated their methods and strategies in a clear, precise, step-by-step manner
- displayed confidence in all aspects of the achievement standard content.

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

- round with sufficient accuracy
- apply the order of operations correctly
- have the knowledge to be able to work with algebraic expressions
- evaluate problems involving volume of basic objects
- find the general formula of a non-linear pattern
- draw a straight-line graph accurately
- distinguish between the perimeter and area of a rectangle, and used the wrong formulae
- apply Pythagoras' Theorem in a three-dimensional problem
- apply trigonometric methods in a two-dimensional problem
- identify the negative slope of a straight line when finding its equation.