Assessment Report

On this page

Level 1 Mathematics and Statistics 2019

Standards 91028 91031 91037

Part A: Commentary

Teachers and candidates should be fully aware of the concepts referred to within the relevant Mathematics Assessment Specifications: https://www.nzqa.govt.nz/ncea/subjects/assessment-specifications/mathematics-l1/

Candidates should be guided by the number of lines provided for a particular solution. It is generally not necessary for the student to fill up the whole blank page in presenting their solution.

Candidates need to be aware that question parts may follow on from each other and are linked. Therefore, a candidate should be actively looking for this connection and, if necessary, turning to earlier pages in the booklet.

Candidates who have a suitable graphical calculator, and know how to use it effectively, could be advantaged. However, it must be noted that students will be expected to demonstrate an understanding of the mathematical concepts, rather than directly transferring results from a graphing calculator. As good mathematical practice, candidates should show intermediate steps in a logical manner and clearly communicate what is being calculated. By giving only the answer,

candidates may lose the opportunity to provide evidence for grades or to have minor errors ignored and are unlikely to provide evidence towards a grade higher than Achievement.

Students should attempt all questions and all parts of their examination. They should be as familiar as possible with all aspects of the material covered by the Achievement Standard.

Part B: Report on standards

91028: Investigate relationships between tables, equations and graphs

Candidates who were awarded **Achievement** commonly:

- understood and formed a straight-line equation from a graph
- understood and formed an equation of a parabola from its graph
- drew part of an exponential graph
- plotted a line from given information
- described some of the features of graphs
- interpreted and constructed a table to help them plot a graph
- described relationships between two variables
- understood the basic concepts necessary to work with at least two different types of graphs.

Candidates whose work was assessed as **Not Achieved** commonly:

- demonstrated insufficient knowledge relevant to tables, equations, graphs and their relationships
- failed to attempt much of the examination paper, apart from Q1(a)
- did not recognise that the gradient of the straight line in Q1(a)(i) had a negative gradient
- could not recognise and draw an exponential graph

- could not interpret graphs in relation to their context
- could not draw graphs even though their tables had been constructed correctly.

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

- represented scenarios with graphs and equations for two or more of quadratics, exponential and linear functions
- recognised and then drew an exponential equation, with sufficient accuracy, from a given equation
- recognised the relationships between equations and graphs and commented on some of their features
- recognised the relationship between a table of an exponential relationship and formed its equation
- drew multiple straight-line graphs from a given scenario
- understood more than one transformation of graphs and how this affected their equation
- utilised equations in order to solve problems
- interpreted both linear and quadratic word problems, with respect to the relationships between tables, equations and graphs
- confidently linked equations and tables to graphs.

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

- interpreted the context of problems and related this to tables, equations and graphs
- understood multiple transformations of graphs and how this affected their equation
- understood the context of a problem that led to a step graph and were able to draw it accurately
- demonstrated confidence in recognising the relationships between equations, tables and graphs in a variety of different contexts and make appropriate interpretations
- could find generalised equations necessary to solve word problems, using quadratic graphs and functions and make appropriate interpretations

- could find generalised equations necessary to solve word problems, using exponential graphs and functions and make appropriate interpretations
- applied strong algebraic skills solving the graphical problems.

Standard-specific comments

Candidates need to be familiar with the use and interpretation of tables, equations and graphs at Level 6 of the New Zealand Curriculum.

Candidates should be familiar with all three types of graph included in this Achievement Standard i.e. linear, quadratic, exponential and step graphs. Knowledge of only linear graphs and / or only simple parabolas will generally not be sufficient for a candidate to gain success.

Achievement Standard 91028 looks specifically at the relationship between tables, equations and graphs, so candidates need to be able to demonstrate knowledge of and interpret such relationships.

Candidates need to explain and justify their reasoning and show working to support their solutions, without over-reliance on the graphical calculator.

Candidates should be familiar with identifying the key features of all families of graphs within AS 91028.

Candidates need to be confident about linking tables, equations and graphs in solving problems.

Candidates need to be familiar with the relationship between the rate of change of a function and the gradient of its graph.

91031: Apply geometric reasoning in solving problems

Candidates who were assessed as **Achievement** commonly:

- were able to apply Pythagoras' theorem
- were able to apply the trigonometric ratios in solving simple problems
- knew the basic geometrical angle rules to identify unknown angles but included the correct geometrical reasons at only one step

- were able to use the theory of similar triangles
- could use the symmetry and properties of regular polygons correctly.

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

- could not use trigonometric ratios correctly
- could not use Pythagoras' theorem to find missing sides in a triangle
- could not use Pythagoras' theorem to find missing angles in a triangle
- were not familiar with the theorems of circle geometry
- used the slant-height instead of the perpendicular height when finding the area of a triangle
- made insufficient progress across the paper as a whole
- were not familiar with identifying angles on a bearing
- did not provide the appropriate and relevant geometric reasons
- made incorrect assumptions from the provided information and instructions
- lacked basic geometric angle property knowledge.

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

- were confident in using a variety of geometrical angle rules, with sufficiently clear and detailed justification, to calculate an unknown angle
- could apply Pythagoras' Theorem to solve more complex problems
- could apply the trigonometric ratios to solve more complex problems
- solved problems that incorporated the knowledge and use of the properties of similar triangles
- were confident in using the circle geometry rules to solve a problem
- were able to make progress in solving problems necessitating knowledge and understanding of bearings
- made only part progress in producing sufficient clarity and detail in the multiply steps necessary in completing a geometrical proof
- were able to link concepts to make significant progress in complex situations
- produced an incomplete chain of geometrical reasoning whilst solving the extended problems.

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

- could solve complex problems necessitating the use of bearings and support this with clear use of geometric reasoning
- correctly used and linked both geometrical and trigonometrical reasoning to solve complex problems in context
- showed confidence, knowledge and understanding when working with circle geometry
- communicated their thinking and solutions clearly and logically, using clear mathematical language
- correctly used and justified geometrical reasoning in completing geometrical proofs.

Standard-specific comments

Very few students were very good at attempting proof questions without incorporating an assumption upon which they based the remainder of the proof.

Students who are able to use algebraic skills are advantaged in some questions.

Candidates should be aware that it is permissible to draw extra lines onto the diagrams, which may help them solve the problem.

Candidates should be aware that every line of a geometric proof must be accompanied by an appropriate geometric reason in order to target the higher grades.

Geometrical reasoning only demonstrated in the diagram is not sufficient evidence.

For this AS 91031, candidates need to be familiar with all aspects up to and including Level 6 of the New Zealand Curriculum. Knowledge beyond this stage is not necessary.

91037: Demonstrate understanding of chance and data

Candidates who were assessed as **Achievement** commonly:

- were able to calculate a probability from a table
- were able to draw a line of best fit
- understood that variation equates to range of a set of data
- were able to calculate a range for a set of data
- were able to recognise similarities and differences in data
- were able to provide one reason / justification / feature from a scatter graph
- were able to provide one reason / justification / feature / trend from a time series graph
- were able to provide one reason / justification / feature from a box and whisker graph.

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

- were not able to solve a probability problem when the information was provided in a table of results
- were unable to make appropriate statistical statements
- did not refer back to the graph when answering the questions
- did not justify their conclusions with appropriate numbers from the data and graphs
- were confused between the various features of different types of statistical graphs.

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

- were able to provide at least two valid reasons / justifications / features from a scatter graph
- were able to provide at least two valid reasons / justifications / features / trends from a time series graph
- were able to provide at least two valid reasons / justifications / features from a box and whisker graph
- were able to utilise appropriate rules to deduce a correct inference from a box and whisker graph
- supported their claims with appropriate statistical reasoning and relating these to the data provided in the question

- understood the differences, validity and appropriateness of the different types of statistical graphs and were able to make subsequent appropriate statements
- were able to display some understanding of the context used in the question
- were able to solve problems involving simple conditional probability
- used correct and appropriate statistical language.

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

- could provide at least three distinct, valid statistical reasons / justifications with reference to the data and by referring to the appropriate graph
- demonstrated statistical understanding and insight
- were able to interpret confidently the context used in the question
- were able to communicate their thinking, ideas, interpretations and statistical knowledge clearly and succinctly, using correct statistical language and vocabulary, displaying abstract thinking in their understanding
- were able to find the probability of combined events in a problem incorporating “without replacement”
- were familiar with and could interpret correctly the DBM / OVS rule in analysing a box and whisker diagram
- were able to provide detailed and insightful comments in relation to a trend live in a bivariate data problem
- were able to provide detailed and insightful comments in relation to a time series graph.

Standard-specific comments

Candidates need to be familiar with the concepts incorporated within this Achievement Standard, at Level 6 of the New Zealand Curriculum, and use the opportunities available to demonstrate their understanding.

Candidates need to ensure that their comments are statistically based and justifications are made with reference to the graphs provided and the data contained within them.

Candidates need to be confident with interpreting statistics within real-world contexts and problems.

Candidates need to be familiar with all aspects of the AS 91037 in order to target higher levels of success.

The use of correct and appropriate statistical language and vocabulary demonstrates understanding of this Achievement Standard.

Candidates need to be in the habit of justifying their comments with reference to the data provided in the tables and / or graphs.

Candidates need to be knowledgeable about what features are evident and relevant in differing graphs.

Some candidates do not read and interpret the given information in the question carefully and consequently do not provide answers with the relevant detail or responses.

Mathematics and Statistics subject page

Previous years' reports

- 2018 (PDF, 124KB)
- 2017 (PDF, 48KB)
- 2016 (PDF, 244KB)