



The following report gives feedback to assist assessors with general issues and trends that have been identified during external moderation of the internally assessed standards in 2024. It also provides further insights from moderation material viewed throughout the year and outlines the Assessor Support available for Mathematics and Statistics.

Insights

91944: Explore data using a statistical enquiry process

This standard has been reviewed and changed. The insights below are for Version 3 of this standard. Version 4 of the standard is published on the NZQA website, ready for use in 2025.

Performance overview:

This standard requires the exploration of data using a statistical enquiry cycle. The statistical enquiry cycle used for investigating statistics or probability in Aotearoa New Zealand is the PPDAC cycle. The cycle consists of five stages: Problem, Plan, Data, Analysis, Conclusion.

The statistical enquiry process can follow one of four styles of investigation: comparison (numerical comparison of two or more groups), relationship (between two numerical variables), time series, or experimental probabilities (involving events with at least two stages). The submitted evidence needs to include an understanding of the relevant contextual knowledge and statistical understanding applicable to exploring data. This involves the use of appropriate statistical language and technology.

At Achieved, evidence of using the plan, data, and analysis components is required.

At higher levels of achievement, evidence of using each component of the statistical enquiry cycle is needed. For Merit, evidence of justification is also needed. For Excellence, the evidence presented needs to include statistical insight.

Practices that need strengthening:

Achieved grades changed in moderation due to a lack of understanding of the requirements of the components of a statistical enquiry cycle required. Due to changes in the criteria of the standard for 2025, it is inappropriate to discuss the issues that arose when explaining sources of variation.

Describing features of the data in context with reference to at least one appropriate visualisation was a criterion that requires development. Ensuring that the description is referring to a feature evident in the visualisation, rather than sample statistics, would address the issue. Identifying the variables when describing the feature is also required to adequately demonstrate understanding. Features described also need to be appropriate to the investigation type and consistent with the expectations of the New Zealand Curriculum, 2007 curriculum level six achievement objectives.

At Merit, connecting ideas within the statistical enquiry process to complete an investigation was a criterion that needed improvement. The statistical enquiry process needs to be appropriately completed for the chosen investigation type to meet this criterion. The second

criterion for Merit involves justifying features consistent with the investigation type in context. This needs to include the use of measures.

At Excellence, evidence of statistical insight requires statistical and contextual knowledge to be incorporated into the completed investigation. To facilitate this the context needs to be familiar and accessible. When using secondary data, care needs to be taken to ensure that the data points on the graph can be readily identified in context.

91945: Use mathematical methods to explore problems that relate to life in Aotearoa New Zealand or the Pacific

Performance overview:

For Achieved, this standard involves using mathematical methods that are appropriate to the problems and communicating accurate mathematical information related to the context of the problem. Evidence of at least four appropriate methods is required from at least two of number, algebra, measurement, or geometry and space.

At Merit, understanding how to apply mathematical methods using logical connections needs some development. There needs to be a more thorough understanding demonstrated that making logical connections involves linking one process (method) to another.

Communicating accurate mathematical information related to the context of the problem and evidence of using appropriate mathematical statements is also a requirement for Merit. Communicating mathematical information effectively is an aspect that needs some development.

Although the criterion for Excellence has been rewritten for 2025 for the purposes of clarity, it still requires (as it did in 2024) evidence of extended abstract thinking when extending methods to explore or solve a problem. This needs to be supported with mathematical evidence.

Practices that need strengthening:

Where Achieved grades were changed in moderation it was largely due to the inappropriate use of mathematical methods. For mathematical methods to be considered as evidence they need to be applied correctly (with correct units and suitable working), relevant to the problems being explored, and relate to the achievement objectives at level six of the New Zealand Curriculum, 2007. Each process (method) chosen needs to come from a different line in the list provided in the Conditions of Assessment for the standard.

Some of the tasks presented comprised questions that were too scaffolded and directed, and therefore the methods used could not be accepted as appropriate evidence for Achieved. The Conditions of Assessment document states: "Assessors cannot give direct instructions on what to do. For example, assessors cannot indicate to a student that they should use Pythagoras' theorem to find a specific length within an identified problem".

Merit requires evidence of relational thinking. Evidence of at least two logical connections is required. Grade changes occurred when inappropriate evidence was accepted as a logical connection, and when mathematical information was not communicated accurately or was unrelated to the context of the problem.

Mathematical methods need to be correctly applied when using logical connections to be accepted as evidence for Merit. These methods must be relevant to the context being explored in the problems presented in the task. This is an area that requires some development. Another area of concern identified in the evidence submitted was that

relational thinking consistent with the previous Level 1 mathematics standard was being accepted as appropriate evidence. This will be remedied by assessors improving their understanding of the criteria required by the standard for Merit.

Excellence grades changed largely due to not enough evidence being present of extended abstract thinking. Evidence cannot be accepted for Excellence if it is focused on speculative comments around the context with no further mathematical exploration being apparent. The standard requires that methods be extended mathematically. Changes to the standard for 2025 reinforce this expectation.

91574: Apply linear programming methods in solving problems

Performance overview:

This standard requires selecting and using linear programming methods in solving problems. This process needs to include demonstrating a knowledge of concepts and terms relevant to the methods being applied. Access to appropriate technology that allows for the development and communication of thinking can contribute to more fluency in the problem-solving process.

Practices that need strengthening:

Where grades were changed in moderation, further development in solving problems relevant to the context was needed. The application of contextually relevant methods was sometimes not visible in the representations provided as evidence. Adequate communication around what the solution represents and how the methods were used to find the solution were other reasons for some provided evidence not meeting the standard.

91587: Apply systems of simultaneous equations in solving problems

Performance overview:

This standard requires applying systems of simultaneous equations in solving problems. Appropriate representations need to be included as part of the evidence for the standard to be achieved. Access to technology can contribute to achieving success in solving problems and allow for a more cohesive communication of the process used to solve problems. Appropriately communicating the solutions in the context of the problem is another factor that resulted in the standard being achieved.

Practices that need strengthening:

Grade changes occurred in moderation when situations were set in contexts that were unfamiliar or resulted in non-whole number solutions. The opportunity for evidence of applying knowledge or understanding of mathematical concepts was therefore hindered. In some cases, this led to the requirements of the standard not being met. Misinterpreting the nature of solutions of systems is another reason that the evidence provided did not meet the standard.

91581: Investigate bivariate measurement data

Performance overview:

Investigating bivariate measurement data involves showing evidence of using each component of the statistical enquiry cycle. This requires using a given multivariate data set to pose an appropriate relationship question to investigate, selecting and using appropriate displays, identifying features in the data, describing the nature and strength of the relationship in context, using the model to make a prediction in context, and communicating

findings in a conclusion. The report needs to demonstrate evidence of relevant contextual knowledge and statistical understanding appropriate to investigating bivariate measurement data. This involves the use of appropriate statistical language.

Practices that need strengthening:

Grades were changed in moderation due to a lack of understanding of the statistical enquiry cycle required for this standard. Posing questions at level 8 of the curriculum is one area that needed improvement. Ensuring that the contextual knowledge used supported the purpose statement made is another. In some instances, the depth of understanding needed to discuss the patterns evident in the scatter graph at the level required resulted in some evidence not meeting the standard.

91580: Investigate time series data

Performance overview:

This standard involves showing evidence of using each component of the statistical enquiry cycle. This means selecting and using appropriate displays, identifying features in the data, finding an appropriate model, using the model to make a forecast, and communicating findings in a conclusion. The report needs to demonstrate evidence of relevant contextual knowledge and statistical understanding applicable to investigating time series data. This involves the use of appropriate statistical language.

Practices that need strengthening:

Grade changes occurred in moderation when the components of the statistical enquiry cycle needed more evidence of the contextual and statistical understanding at level 8 of the curriculum. In some instances, the statistical discussion was not consistent with the variable being investigated and contextual reasoning lacked coherence. A more comprehensive understanding of the context of the investigation needed to be evident to meet the standard.

Assessor Support

NZQA offers online support for teachers as assessors of NZC achievement standards. These include:

- Exemplars of student work for most standards*
- National Moderator Reports*
- Online learning modules (generic and subject-specific)**
- Clarifications for some standards*
- Assessor Practice Tool for many standards**
- Webcasts*

*hosted on the NZC Subject pages on the NZQA website.

**hosted on Pūtake, NZQA's learning management system. Accessed via Education Sector Login.

We also may provide a speaker to present at national conferences on requests from national subject associations. At the regional or local level, we may be able to provide online support.

Please contact workshops@nzqa.govt.nz for more information or to lodge a request for support.

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