



NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

National Qualifications Framework Levels 1–3, 2006

Mathematics

National Moderator's Report

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General Guidance for Assessors of Achievement and Unit Standards

The purpose of external moderation is to provide reassurance that assessor judgments are at the national standard and are made on the basis of assessment materials that are fair and valid.

All assessment materials are expected to:

- give the learner the opportunity to meet the requirements of the standard
- have an assessment schedule that gives evidence of appropriate learner responses and clear judgments at all levels.

The Ministry of Education contracted subject experts to write assessment resources for achievement standards. These are not pre-moderated. The intention is that they are modified to suit teaching programmes and learner needs. They do not provide “rules” but suggest different ways of assessing to the nationally registered standard.

General Overall Comment

- Assessment schedules must be complete and include the evidence expected from the students to enable verification of consistency of assessor judgements. This means all answers must be included and where statements are required examples of acceptable statements must be included.
- Student responses must be appropriate for the curriculum level of the standard. Detailed written explanations and justifications are required for merit or excellence, trivial answers can attain no higher than achievement.
- The use of technology in internally assessed standards is expected. However there are some unit standards that specify that calculators are not to be used.
- For unit standards students should generally not be expected to have 100% of their responses correct.
- For all Level 3 Statistics standards the removal of points that are furthest from a line of best fit as an “outlier” is unjustified.

90647: Use a mathematical model involving curve fitting to solve a problem

- Where the starting value is known e.g. the number of drawing pins, this value must be used in the model.
- Candidates must use their own raw data for merit and excellence. This is clarified further in version 3 of the standard.
- For Excellence the justification of the choice of mathematical model was frequently not clearly stated and/or trivial comments were being accepted. A range indicating the expected student responses must be included in the assessment schedule.
- Derivation of the log transformation is no longer part of this standard

- The tendency to use R^2 value as the principal justification for the model rather than considering the nature of the situation is inappropriate.

90645: Select and analyse continuous bi-variate data

- For achievement candidates are required to write a purpose statement. This should be made clear in the assessment task and required in the evidence submitted. This must be about any potential relationships between the variables and not pre-empt the outcome.
- Students must use continuous variables that are required by the title of the standard.
- Students must describe the relationship.
- Improvements were often still judged simply on R^2 value with no discussion on whether the equation made sense.

90641: Determine the trend for time series data

- Descriptions of the trend were better than in previous years, although many were marginal. Responses such as “it is increasing” are insufficient.
- Raw data was often used to make forecasts.
- There is still confusion over seasonally adjusted data. See below.

Additional notes

An interpretation of seasonally adjusted data

Seasonally adjusted time series data are obtained by subtracting the appropriate estimated seasonal effect (the mean of the individual seasonal effects for that season) from each observation. Since the adjusted data have had (estimates of) the seasonal effects removed, the trend component (and error effects) is left.

Seasonally adjusted data allow comparisons to be made over *consecutive periods* to identify if it is likely that there are movements in the underlying trend (one can only say “likely that there are movements in the underlying trend” since, as noted, the seasonally adjusted values still contain error effects, and observed variation may be due to these). Although the trend line provides a view of the trend, variations between seasons are smoothed out, so masking any season-by-season variation in the trend (the trend line could be said to show the “average trend” or the “overall trend”).

As an example, suppose we have the following:

Quarter	Observation	Seasonally adjusted value
1	956	950
2	972	961
3	943	973
4	961	965
5	948	970

Then we can say, from the seasonally adjusted data, “It is likely that the trend is increasing over quarters 1 to 3, it then decreases between quarter 3 and quarter 4, and then it starts increasing again”; since, as noted above, the quarter-by-quarter variations may be due primarily to error effects rather than variations in the underlying trend.

90637: Solve problems and equations involving trigonometric functions

- The revised standard, version 2, should be used.
- Multiple solutions are required for achievement.
- The assessor must not give the form of the model for students to achieve with merit.

90288: Select a sample and use this to make an inference about the population

- Inferences were often not related back, as they should be, to the context, or acknowledged as being an estimate.
- Many tasks show more scaffolding than is appropriate at this level.
- Margins of error are not required in this standard.
- Comments such as “the sample must be representative because I used stratified random sampling” must be related back to the characteristics of the population.
- Where there are multiple strata and the sample is small stratified sampling may result in unreliable results.
- This standard requires calculation of appropriate statistics – this may not necessarily be the mean and standard deviation
- Comments justifying the sampling method may explain the strength of their method or give ways in which it could be improved.

90291: Solve trigonometry problems requiring modelling of practical situations

- This standard must involve a practical situation in which students take measurements of real objects.
- An acceptable range of actual measurements must be included in the schedule.
- Measurements should be sensibly rounded to an acceptable level of accuracy.

90149: Solve problems involving measurement of everyday objects

- Candidates must use their own measurements to solve a problem
- The student should state all the measurements that they take in order to solve the problem.
- The acceptable range for these measurements must be included in the schedule.
- Students are expected to know that units form part of their answer in measurement problems and should not be reminded of this in the assessment.
- Scale diagrams are not acceptable for measuring in practical situations.

90193: Use statistical methods and information

- Too many trivial responses are being accepted with reference to the features or the statistics calculated
- For excellence comments must, as required by the standard, relate to the statistical process not to the data.

90150: Use geometric techniques to produce a pattern or object

- To indicate a set of points, say 1.5cm or less than, from a given point the shape needs to be shaded.
- Diagrams showing expected student responses must be included in the schedule.

5244: Demonstrate calculus skills

Calculators are not permitted

12331: Investigate and report on the mathematics of a given project

This is a level 2 standard and the mathematics or mathematical processes involved are expected to be above level 1.