Achievement Standard

Subject Reference	Science 3.1				
Title	Carry out a practical scientific investigation with guidance				
Level	3	**Credits**	4	**Assessment**	Internal
Subfield	Science				
Domain	Science – Core				
Registration date	9 November 2005	**Date version published**	9 November 2005		

This achievement standard involves the student carrying out a practical scientific investigation individually, with guidance, by planning the investigation, collecting and processing data, and interpreting and reporting the findings.

Achievement Criteria

Achievement	Achievement with Merit	Achievement with Excellence
• Carry out a practical science investigation with guidance.	• Carry out a quality practical science investigation with guidance.	• Carry out and evaluate a quality practical science investigation with guidance.

Explanatory Notes

1 This achievement standard is derived from *Science in the New Zealand Curriculum,* Learning Media, Ministry of Education, 1993, Developing Scientific Skills and Attitudes strand, pp. 42–51. This achievement standard is also related to *Pūtaiao i roto i te Marautanga o Aotearoa*, Learning Media, Ministry of Education, 1996, Ngā Pūkenga me ngā Waiaro ki te Pūtaiao, pp. 70–85.

2 Procedures outlined in *Safety and Science: Revised edition: A Guidance Manual for New Zealand Schools*, (Wellington: Learning Media, 2000) should be followed. Investigations should comply with the Animal Welfare Act 1999, as outlined in the Ministry of Education's *Caring for Animals: A Guide for Teachers, Early Childhood Educators, and Students*, (Wellington: Learning Media, 1999).

3 *With guidance* means the teacher provides general information only, eg in the form of suggested topics, resource suggestions, appropriate timing, possible new directions or ethical considerations. The student will choose the context and purpose, experimental conditions and will select and manipulate the variables to collect primary data.

4 The practical science investigation is to be carried out by the student individually, and is to cover the complete process as stated in Explanatory Note 5. The investigation could be based on a fair test or pattern seeking.

5 *A practical science investigation* will include:

- a statement of the purpose – this may include an aim, testable question, prediction, or hypothesis based on a scientific idea
- trialling as appropriate to determine the method
- a method that describes:
  - for a fair test: the independent variable and a range, the accurate measurement of the dependent variable and the control of some other variables
  - for pattern seeking: the range for the key variables and the collection of data and the control of some other variables where necessary
- collecting sufficient data consistent with the final method
- recording data systematically
- processing of data, using graphs and/or other techniques
- interpretation of data including some identification of trends, relationships and patterns, where appropriate
- clear reporting on the findings with a valid conclusion related to the purpose of the investigation
- identification of at least one of the science ideas relevant to the investigation.

6 *A quality practical science investigation* will include

- a statement of the purpose – this may include an aim, testable question, prediction, or hypothesis based on a scientific idea
- trialling as appropriate to determine the method
- a method that describes:
  - for a fair test: the independent variable and a valid range, the accurate measurement of the dependent variable and the control of most other variables
  - for pattern seeking: the valid range for the key variables and the collection of reliable data and the control of most other variables where necessary
- collecting sufficient, reliable data consistent with the final method with identification and appropriate treatment of extremes of data as necessary
- recording of data systematically with appropriate precision
- processing of data, using graphs and/or other techniques
- interpretation of data including identification of trends, relationships and patterns, where appropriate
- clear reporting on the findings with a valid conclusion related to the purpose of the investigation
- explanation of science ideas relevant to the investigation.

7 *Evaluate* means to discuss a selection of factors relevant to the investigation which may include:

- reliability of the data
- justification of the final method use
- discussion of sources of error
- implications and possible future investigation.

Quality Assurance

1 Providers and Industry Training Organisations must be accredited by the Qualifications Authority before they can register credits from assessment against achievement standards.

2 Accredited providers and Industry Training Organisations assessing against achievement standards must engage with the moderation system that applies to those achievement standards.

Accreditation and Moderation Action Plan (AMAP) reference 0226