

## Achievement Standard

**Subject Reference** Biology 2.1

**Title** Carry out a practical biological investigation with supervision

**Level** 2                      **Credits** 3                      **Assessment** Internal

**Subfield** Science

**Domain** Biology

**Registration date** 26 November 2004

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This achievement standard involves carrying out a practical biological investigation, with supervision, by planning the investigation, collecting and processing the data, and interpreting and reporting the findings.

### Achievement Criteria

Achievement	Achievement with Merit	Achievement with Excellence
<ul style="list-style-type: none"> <li>Carry out a practical biological investigation.</li> </ul>	<ul style="list-style-type: none"> <li>Carry out a quality practical biological investigation.</li> </ul>	<ul style="list-style-type: none"> <li>Carry out and evaluate a quality practical biological investigation.</li> </ul>

### Explanatory Notes

- This achievement standard is derived from *Biology in the New Zealand Curriculum*, Learning Media, Ministry of Education, 1994, p. 38, 'Developing Scientific Investigative Skills and Attitudes in Biology'.
- Procedures outlined in *Safety and Science: a Guidance Manual for New Zealand Schools*, Learning Media, Ministry of Education, 2000, should be followed. Investigations should comply with the Animal Welfare Act 1999, as outlined in *Caring for Animals: a Guide for Teachers, Early Childhood Educators, and Students*, Learning Media, Ministry of Education, 1999.
- Investigations will be based on situations arising from content at level 7 of *Biology in the New Zealand Curriculum*, Learning Media, Ministry of Education, 1994, pp. 20-26.

- 4 An investigation is an activity covering the complete process: to plan, carry out, process and interpret data, and report on the investigation. It will involve students in the collection of primary data. It is expected that students will have opportunity to make changes to their initial method as they work through the investigation.
- 5 The nature of the investigation could be the manipulation of variables (fair test) or the investigation of a pattern or relationship.
- 6 *With supervision* means the teacher gives students guidelines for the investigation such as the context for the investigation, instructions giving the requirements for a quality investigation, and broad experimental conditions such as the availability of equipment or chemicals. It may also involve discussion with individual students in order to clarify their ideas. Students then develop and complete the investigation from the initial guidelines given by the teacher.
- 7 *A practical biological investigation* will involve
- a statement of the purpose – this may be an aim, testable question, prediction, or hypothesis based on a scientific idea
  - a method that describes:
    - for a fair test: the independent variable and its range, the measurement of the dependent variable and the control of some other key variables
    - or pattern seeking: the data that will be collected, range of data/samples, and consideration of some other key factors
  - collecting, recording and processing data relevant to the purpose
  - interpreting and reporting on the findings with a conclusion reached based on the processed data in relation to the purpose of the investigation.
- 8 *A quality practical biological investigation* enables a valid conclusion to be reached. This would normally involve
- a statement of the purpose – this may be an aim, testable question, prediction or hypothesis based on a scientific idea
  - a method that describes:
    - for a fair test: a valid range for the independent variable, the valid measurement of the dependent variable and the control of other variables, with consideration of factors such as sampling bias and sources of errors
    - for pattern seeking: a valid collection of data with consideration of factors such as sampling bias and sources of errors.
  - collecting, recording and processing data to enable a trend or pattern (or absence) to be determined
  - interpreting and reporting on the findings with a valid conclusion reached based on the processed data in relation to the purpose of the investigation
  - a discussion of the biological ideas relating to the investigation.
- 9 *Evaluate* means to justify the conclusion in terms of the method used. This will involve, where relevant, consideration of the:
- reliability of the data
  - validity of the method.

### 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