

Achievement Standard

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| Subject Reference | Biology 3.1 | | |
| Title | Carry out a practical investigation in a biological context, with guidance | | |
| Level | 3 | Credits | 4 |
| | | Assessment | Internal |
| Subfield | Science | | |
| Domain | Biology | | |
| Status | Registered | Status date | 4 December 2012 |
| Planned review date | 31 December 2016 | Date version published | 4 December 2012 |

This achievement standard involves carrying out a practical investigation in a biological context, with guidance.

Achievement Criteria

| Achievement | Achievement with Merit | Achievement with Excellence |
|-------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> Carry out a practical investigation in a biological context, with guidance. | <ul style="list-style-type: none"> Carry out an in-depth practical investigation in a biological context, with guidance. | <ul style="list-style-type: none"> Carry out a comprehensive practical investigation in a biological context, with guidance. |

Explanatory Notes

- This achievement standard is derived from *The New Zealand Curriculum*, Learning Media, Ministry of Education, 2007, Level 8, within the Science learning area. It is aligned with the following achievement objectives from the Nature of Science strand:
 - Investigating in science, 'Develop and carry out investigations that extend their science knowledge, including developing their understanding of the relationship between investigations and scientific theories and models'
 - Understanding about science, 'Understand that scientists have an obligation to connect their new ideas to current and historical scientific knowledge and to present their findings for peer review and debate'.

It is also related to the material in the *Teaching and Learning Guide for Biology*, Ministry of Education, 2010, at <http://seniorsecondary.tki.org.nz>.

Procedures outlined in *Safety and Science: a Guidance Manual for New Zealand Schools*, Learning Media, Ministry of Education, 2000, must be followed. Investigations must 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.

- 2 *Carry out a practical investigation in a biological context, with guidance* involves:
- developing a statement of the purpose, linked to a scientific concept or idea, and written as a hypothesis
 - using 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
 - for a pattern seeking or modelling activity: 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 of the investigation
 - interpreting the processed data and reporting on the findings of the investigation
 - identifying relevant findings from another source
 - stating a conclusion based on interpretation of the processed data which is relevant to the purpose of the investigation.

Carry out an in-depth practical investigation in a biological context, with guidance involves:

- using a valid 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 key variables, with consideration of factors such as sampling bias and sources of errors
 - for a pattern seeking or modelling activity: a valid collection of data with consideration of factors such as sampling bias and sources of errors
- collecting, recording, and processing reliable data to enable a trend or pattern (or absence) to be determined
- stating a valid conclusion based on the processed data in relation to the purpose
- explaining the biological ideas relating to the investigation. The explanation is based on both the findings from the investigation and those from other source(s).

Carry out a comprehensive practical investigation in a biological context, with guidance involves:

- justifying the choices made throughout the investigation by evaluating the validity of the method or the reliability of the data
 - stating a conclusion that discusses the biological ideas relevant to the investigation and either the findings of others, scientific principles, theories, or models.
- 3 *A practical investigation* is an activity covering the complete process: planning, carrying out, processing, interpreting data, and reporting on the investigation. It will involve the collection of primary data. It is expected that the student will have opportunity to make changes to their initial method as they work through the investigation. The nature of the investigation could be the manipulation of variables (fair test), the investigation of a pattern, or relationship, or the use of models.
- 4 *With guidance* refers to the teacher supporting the student throughout the investigation. The teacher negotiates the parameters for the investigation with the student. This may be related to suitability of organisms, equipment and resources available, and possible modifications or new directions related to the student investigative ideas. The investigative process is student driven.

- 5 Conditions of Assessment related to this achievement standard can be found at www.tki.org.nz/e/community/ncea/conditions-assessment.php.
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Replacement Information

This achievement standard replaced AS90713.

Quality Assurance

- 1 Providers and Industry Training Organisations must have been granted consent to assess by NZQA before they can register credits from assessment against achievement standards.
- 2 Organisations with consent to assess and Industry Training Organisations assessing against achievement standards must engage with the moderation system that applies to those achievement standards.

Consent and Moderation Requirements (CMR) reference

0233