



National Certificate of Educational Achievement  
TAUMATA MĀTAURANGA Ā-MOTU KUA TAEA

## Internal Assessment Resource

### Biology Level 2

This resource supports assessment against:

Achievement Standard 91155 version 2

Demonstrate understanding of adaptation of plants or animals  
to their way of life

**Resource title: The birds and the bees and the flowers and  
the trees...**

3 credits

This resource:

- Clarifies the requirements of the standard
- Supports good assessment practice
- Should be subjected to the school's usual assessment quality assurance process
- Should be modified to make the context relevant to students in their school environment and ensure that submitted evidence is authentic

Date version published by Ministry of Education	July 2017 Version 3 To support internal assessment from 2017
Quality assurance status	These materials have been quality assured by NZQA. NZQA Approved number: A-A-07-2017-91155-03-5831
Authenticity of evidence	Teachers must manage authenticity for any assessment from a public source, because students may have access to the assessment schedule or student exemplar material.  Using this assessment resource without modification may mean that students' work is not authentic. The teacher may need to change figures, measurements or data sources or set a different context or topic to be investigated or a different text to read or perform.

## Internal Assessment Resource

**Achievement Standard Biology 91155:** Demonstrate understanding of adaptation of plants or animals to their way of life

**Resource reference:** Biology 2.3A v3

**Resource title:** The birds and the bees and the flowers and the trees...

**Credits:** 3

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### Teacher guidelines

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The following guidelines are supplied to enable teachers to carry out valid and consistent assessment using this internal assessment resource.

Teachers need to be very familiar with the outcome being assessed by achievement standard Biology 91155. The achievement criteria and the explanatory notes (EN) contain information, definitions, and requirements that are crucial when interpreting the standard and assessing students against it.

### Context/setting

This activity requires students to demonstrate understanding of adaptations across **three** taxonomic plant groups, selected from mosses, ferns, conifers, angiosperms, for the life process of reproduction.

Students are required to link the described adaptations to the organism's way of life. Refer to EN 5 for guidance to help clarify what 'way of life' should encompass. It includes:

- relationships with other organisms – competition, predation, parasitism, mutualism
- reproductive strategies
- adaptations to the physical habitat.

Teachers should note however that adaptations only need to be described, explained or discussed in relation to those aspects relevant to the investigated organism's way of life e.g. if the life process being investigated is nutrition in plants (e.g. photosynthesis) then there may not be any direct link to the reproductive strategies or predation of the organism. Thus evidence statements in the assessment schedule should be modified accordingly.

### Conditions

Evidence for this assessment might include annotated diagrams and/or drawings from dissection or direct observations of organisms.

Students will keep a portfolio in which they will record all information such as drawings, results from investigations, notes from DVDs, class discussions, processed information from internet sites and textbooks; annotated diagrams, formal notes made in class.

Teachers need to decide the format required of the final report. For example, it could be written, or presented as a PowerPoint presentation, seminar, DVD or web page.

More information on the Conditions of Assessment related to this achievement standard can be found at <http://ncea.tki.org.nz/Resources-for-Internally-Assessed-Achievement-Standards>.

## Resource requirements

- access to relevant textbooks
- internet access
- DVDs.

## Additional information

Students will need to have a base knowledge of:

- the three taxonomic groups
- adaptations (structural, behavioural, physiological)
- ecological niche, inter- and intra-specific relationships
- asexual and sexual reproduction.

A range of teaching and learning opportunities should be provided so students can collect information and add it to their portfolios, including:

- practical activities, such as:
  - examination of whole plants e.g. mosses and ferns with capsules
  - dissection of e.g. spores, gymnosperm cones, angiosperm flowers (wind and insect pollinated), fruit, seeds
  - examination of microscopic slides of e.g. pollen tubes, prothallus
  - stomata in the epidermis of leaves of xerophytes and mesophytes, different species of *Coprosma* living in two different habitats
- field studies / observations e.g. plant nursery, botanic garden, forest
- models
- classroom discussion
- formal classroom teaching
- independent research using primary and/or secondary sources.

## **Teacher Resource**

### ***Life processes***

Select life processes (EN 6) that are connected or related from:

- internal transport
- gas exchange
- transpiration
- nutrition
- excretion
- support and movement
- sensitivity and co-ordination
- reproduction.

### ***Taxonomic groups***

Taxonomic groups could include, but are not limited to:

- Plants: bryophytes – mosses and liverworts; tracheophytes – ferns; gymnosperms – conifers, angiosperms
- Animals: insects, vertebrates, mammals.

### ***Functional groups***

Functional groups could include, but are not limited to:

- Plants:
  - Nutrition: sun adapted, shade adapted, carnivorous, parasitic
  - Transpiration: mesophytes, xerophytes, hydrophytes
- Animals:
  - Nutrition: fluid feeders (parasites), filter feeders, detritus feeders; carnivorous, herbivorous, omnivorous mammals
  - Transport: open circulation, closed circulation – single, partial double, complete double
  - Support and Movement: hydrostatic skeleton, endoskeleton, exoskeleton
  - Sensitivity and Coordination: nerve network system, simple central nervous system, complex central nervous system.

### ***Groups and life processes***

Group(s) and life processes might include:

- gas exchange and transport in mammals
- transpiration and transport in angiosperms
- nutrition and transport in carnivorous plants
- nutrition and gas exchange in ectoparasites
- support and movement and gas exchange in mammals
- nutrition and excretion in insects.

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Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of adaptation of plants or animals to their way of life.	Demonstrate in-depth understanding of adaptation of plants or animals to their way of life.	Demonstrate comprehensive understanding of adaptation of plants or animals to their way of life.

### Student instructions

#### Introduction

This assessment activity requires you to work individually to produce a portfolio of information which you can use to develop a written report on the adaptations relating to plant reproduction across **three** taxonomic plant groups <<teacher to insert from mosses, ferns, conifers, and angiosperms>> and how these adaptations allow the different plants to carry out their way of life or occupy the ecological niches that they do.

Teacher note: It is expected that you will make the selection based on resources and accessibility and then remove those groups not being assessed from these instructions. The task can be modified to adaptations relating to another life process across three functional plant groups, or another life process across three taxonomic or functional animal groups.

This is a resource-based assessment: you are able to access resources gathered in your programme of learning as you write your report.

You will have 3–4 weeks in and out of class to collect information, develop a portfolio, and present your report.

Your portfolio will record all the information you collect on plant reproduction, such as drawings from observations and examinations, results from investigations, notes from DVDs, class discussions, processed information from internet sites and textbooks, annotated diagrams, and formal notes made in class. You will use this information to develop your report.

You will have approximately 2 hours of class time to individually write your report.

Teacher note: Amend the time frames and add dates for gathering material for the portfolio and for producing the final report to suit your students and context.

Other formats for the report are possible. For example, it could be written, or presented as a PowerPoint presentation, seminar, DVD or web page. If another format is used, you will need to ensure the sufficiency of the evidence and provide guidance about the time needed to develop the report.

You will be assessed on the extent to which your report shows your comprehensive understanding of how the three plant groups are adapted to their way of life in relation to the life process of reproduction.

An organism's *way of life* is determined by how it relates to other organisms in its surrounding environment (e.g. competition, predation, parasitism, mutualism), the reproductive strategies it employs to ensure survival of the species and how it adapts to its physical habitat. Their *adaptations* involve the range of ways in which the organism has developed strategies to carry out their life processes in order to survive and reproduce. An adaptation refers to a feature and its function that provides an advantage for the organism in its specific habitat and ecological niche. It may include structural, behavioural, or physiological features of the organism.

## Task

Complete a written report on the adaptations relating to plant reproduction across **three** taxonomic plant groups, and how and why these adaptations allow them to survive in their habitat. Use your portfolio of collected, relevant biological information to provide supporting evidence. Your written report should:

- Name the three plant groups you have studied and provide a brief description of each of their ecological niches e.g. physical habitat, relationships with other organisms
- Describe the structural, behavioural, and/or physiological adaptations that enable the plants in each group to carry out reproduction. You may use annotated diagrams to support your answer

Teacher note: Adapt this as necessary to suit any other life process, taxonomic, functional, plant or animal groups that have been substituted.

- Explain how or why these adaptations enable the plants in each group to reproduce successfully. You should provide examples to support your explanations
- Discuss the diversity shown in reproduction by comparing the process of plant reproduction and these adaptations across the three plant groups
  - Your discussion should link several biological ideas by comparing diversity of adaptation in response to the same demand across the plant groups to live successfully in their habitat
  - You need to include examples of specific advantages and/or limitations of named features or processes for reproduction across the three plant groups
- You may use annotated diagrams to support your answer.

Hand your portfolio to your teacher along with your completed report.

## Assessment schedule: Biology 91155 The birds and the bees and the flowers and the trees...

Evidence/Judgements for Achievement	Evidence/Judgements for Achievement with Merit	Evidence/Judgements for Achievement with Excellence
<p>The student demonstrates understanding of adaptation of plants relating to one life process over three taxonomic or functional groups to their way of life.</p> <p>The written report will include a named, description of the three taxonomic/functional plant groups studied.</p> <p>For each plant group:</p> <ul style="list-style-type: none"> <li>• A description of two adaptations (structural, behavioural or physiological) that help the plant group reproduce</li> <li>• A description of one adaptation that enables the plant group to: <ul style="list-style-type: none"> <li>- survive in their physical habitat, or</li> <li>- relate to other organisms e.g. competition, mutualism, parasitism.</li> </ul> </li> </ul> <p>The report may include as evidence, diagrams as appropriate, clearly annotated.</p> <p>For example:</p> <p><i>Sexual reproduction in mosses, ferns and angiosperms involves the process of alternation of generations. The gametophyte generation produces haploid gametes. The sporophyte generation produces diploid spores.</i></p> <p><i>In mosses the gametophyte generation (the leafy green moss plant of the forest floor) is dominant over the sporophyte (seen as the capsules arising from the leafy plant).</i></p> <p><i>Using their flagellum, the sperm swim to the ova.</i></p> <p><i>The mature spores are released from the capsule</i></p>	<p>The student demonstrates in-depth understanding of adaptation of plants relating to one life process over three taxonomic or functional groups to their way of life.</p> <p>The written report will include a named, description of the three taxonomic/functional plant groups studied.</p> <p>For each plant group:</p> <ul style="list-style-type: none"> <li>• A description of two adaptations (structural, behavioural or physiological) that help the plant group reproduce</li> <li>• A description of one adaptation that enables the plant group to: <ul style="list-style-type: none"> <li>- survive in their physical habitat, or</li> <li>- relate to other organisms e.g. competition, mutualism, parasitism.</li> </ul> </li> </ul> <p>The report may include as evidence, diagrams as appropriate, clearly annotated.</p> <p>AND</p> <p>For at least <b>two</b> plant groups:</p> <ul style="list-style-type: none"> <li>• Providing a biological reason explaining how or why <b>two</b> adaptations (structural, behavioural or physiological) for reproduction enables them to survive in their habitat.</li> </ul> <p>For example:</p> <p><i>In mosses, the male sex organs are the antheridia found at the tips of the leafy stems and produce free-swimming sperm in the process of mitosis.</i></p> <p><i>The female sex organs are the archegonia which are also found at the tips of the leafy stems. They</i></p>	<p>The student demonstrates comprehensive understanding of adaptation of plants relating to one life process over three taxonomic or functional groups to their way of life.</p> <p>The written report will include a named, description of the three taxonomic/functional plant groups studied.</p> <p>For each plant group:</p> <ul style="list-style-type: none"> <li>• A description of two adaptations (structural, behavioural or physiological) that help the plant group reproduce</li> <li>• A description of one adaptation that enables the plant group to: <ul style="list-style-type: none"> <li>- survive in their physical habitat, or</li> <li>- relate to other organisms e.g. competition, mutualism, parasitism.</li> </ul> </li> </ul> <p>The report may include as evidence, diagrams as appropriate, clearly annotated.</p> <p>AND</p> <p>For at least <b>two</b> plant groups:</p> <ul style="list-style-type: none"> <li>• Providing a biological reason explaining how or why <b>two</b> adaptations (structural, behavioural or physiological) for reproduction enables them to survive in their habitat.</li> </ul> <p>AND</p> <p>Linking several biological ideas to compare reproduction across the three plant groups to include:</p> <ul style="list-style-type: none"> <li>• the diversity of the adaptations in response to the same demand for reproduction</li> </ul>

<p><i>and are dispersed by wind.</i></p> <p><i>The spores germinate and grow into a new moss plant in damp conditions.</i></p> <p><i>The examples above are indicative samples only.</i></p>	<p><i>produce ova also in the process of mitosis.</i></p> <p><i>Using their flagellum, the sperm swim in a film of water to the ova guided by a chemical trail (process of chemotaxis).</i></p> <p><i>Fusion of a sperm and an ovum occurs in fertilization to form a diploid zygote. This grows into the sporophyte generation which produces spores in a capsule.</i></p> <p><i>The mature spores are released from the capsule when it dries out and are dispersed by the wind to a new habitat.</i></p> <p><i>In moist conditions; the spores germinate and grow into a new gametophyte...</i></p> <p><i>The examples above are indicative samples only.</i></p>	<ul style="list-style-type: none"> <li>• advantages and/or limitations of named features or processes for reproduction.</li> </ul> <p>For example:</p> <p><i>In both mosses and ferns, fertilization is external and the sperm swims in a film of water using chemotaxis to locate the ovum. This process restricts both these two groups of plants to moist habitats as in dry habitats there is insufficient water to allow fertilization. Internal fertilization removes the dependency on water for fertilization allowing plants to inhabit in all terrestrial environments.</i></p> <p><i>In angiosperms, fertilization is completely internal occurring within the flower. This allows angiosperms to occupy a much greater range of habitats than either mosses or ferns including arid desert habitats. Angiosperms are therefore much more widely spread throughout the world than either mosses or ferns and typically are the dominant members of plant communities.</i></p> <p><i>The examples above are indicative samples only.</i></p>
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Final grades will be decided using professional judgement based on a holistic examination of the evidence provided against the criteria in the achievement standard.