**NZQA**

**Approved**

Achievement standard: 91160 Version 2

Standard title: Investigate biological material at the microscopic level

Level: 2

Credits: 3

Resource title: Cabernet Sauvignon through a microscope

Resource reference: Biology VP-2.8 v2

Vocational pathway: Primary Industries

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| Quality assurance status | These materials have been quality assured by NZQA. NZQA Approved number A-A-02-2015-91160-02-8142 |
| Authenticity of evidence | Assessors/educators must manage authenticity for any assessment from a public source, because learners may have access to the assessment schedule or exemplar material.Using this assessment resource without modification may mean that learners’ work is not authentic. Assessors/ educators 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. |

Vocational Pathway Assessment Resource

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Learner instructions

# Introduction

This assessment activity requires you to investigate two different plant tissues and a unicellular organism at the microscopic level.

You are going to be assessed on how you carry out an in-depth investigation of the cell structures and components found in grapevine stems, grape leaves and yeast cells by preparing and viewing slides using a light microscope, and recording your observations in biological drawings. You also need to provide reasons for how or why the observed specialised features enable the cells or tissues to effectively carry out specific function(s).

The following instructions provide you with a way to structure your work so you can demonstrate what you have learnt and achieve success in this standard.

Assessor/educator note: It is expected that the assessor/educator will read the learner instructions and modify them if necessary to suit the learners.

# Task

An understanding of plants and very small living things (unicellular organisms) is important to all agricultural, horticultural, and farming practices. The specialised features of the cells and tissues of the different varieties of grapevines, and the way these function, are vital to the wine industry in New Zealand. A group of winemakers who are interested in the biology of the grapevine cultivar ‘Cabernet Sauvignon’ at the microscopic level, and yeast associated with it in producing wine, have asked you to investigate this and present your findings to them.

You will produce a portfolio which contains annotated biological drawings of the three samples of the biological material provided.

In order to complete your drawings, using the techniques you have learned with light microscopes, you need to:

* prepare microscope slides of the grapevine cultivar ‘Cabernet Sauvignon’ and yeast provided for viewing
* view the material using a light microscope so you can identify the specialised features for each drawing, such as:
	+ the arrangement of cells or cell types within a tissue
	+ the presence or absence of a specific organelle
	+ the quantity or distribution of organelles within a cell.

Include in your portfolio three biological drawings for a slide from each of:

* an epidermal tear from a young leaf of grapevine cultivar ‘Cabernet Sauvignon’
* a stem cross section of a young grapevine cultivar ‘Cabernet Sauvignon’
* yeast cells, as an example of a unicellular organism.

Your biological drawings should clearly show visible, specialised features, and must be consistent with what you see.

Show your assessor/educator each microscope slide preparation, including the focused slide and your biological drawing of it, before you add this to your portfolio.

Make sure each slide has been correctly prepared, focused and that your biological drawing is an accurate representation of what your slide shows.

Annotate each drawing by labelling at least two special features, stating the function of each feature, and explaining how or why each enables the cell or tissue to carry out its specific function(s) effectively.

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Assessor/Educator guidelines

# Introduction

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

As with all assessment resources, education providers will need to follow their own quality control processes. Assessors/educators must manage authenticity for any assessment from a public source, because learners may have access to the assessment schedule or exemplar material. Using this assessment resource without modification may mean that learners' work is not authentic. The assessor/educator may need to change figures, measurements or data sources or set a different context or topic. Assessors/educators need to consider the local context in which learning is taking place and its relevance for learners.

Assessors/educators need to be very familiar with the outcome being assessed by the achievement standard. The achievement criteria and the explanatory notes contain information, definitions, and requirements that are crucial when interpreting the standard and assessing learners against it.

# Context/setting

This activity requires learners to investigate in-depth the cells and tissues in a young leaf and stem of the grapevine cultivar ‘Cabernet Sauvignon,’ and yeast cells as an example of a unicellular organism associated with it in wine making, at the microscopic level. Learners will use a light microscope to prepare and view slides, then record their observations in a portfolio containing three annotated biological drawings that match their prepared slides, and provide reasons for how or why the observed specialised features enable cells or tissues to effectively carry out specific function(s).

# Conditions

This is an individual activity and learners will be individually assessed.

# Resource requirements

The assessor/educator will need to provide learners with:

* suitable young leaves and stems of the grapevine cultivar ‘Cabernet Sauvignon,’ so that their cells and tissues can be viewed using a light microscope
* yeast cells in suspension
* light microscopes with at least three magnifications up to X 400
* clean microscope slides, cavity slides, coverslips
* suitable stains, e.g. iodine, toluidine blue, eosin
* paint brushes, petri dishes, paper towels, razor blades.

# Additional information

The use of a marking grid would aid the tracking of achievement of the practical aspects involving the preparation and viewing of slides. For example, a grid showing the specific microscope slide preparation and viewing criteria for each of the three slides prepared for view. The criteria must be consistent with the assessment schedule and can be abbreviated by code.

The biological material chosen must have cells or tissues with specialised features. Without the use of a stain this could exclude some plant material.

## Other possible contexts for this vocational pathway

The context of this task is adaptable and could be made relevant to suit other roles and occupations within the Primary Industries vocational pathway (e.g. growing cash crops like wheat, barley, oats and maize). However, assessors/educators would need to ensure that relevant and suitable plant tissues and cultures of unicellular organisms that can be viewed using a light microscope are also provided.

# Assessment schedule: Biology 91160 – Cabernet Sauvignon through a microscope

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| Evidence/Judgements for Achievement | Evidence/Judgements for Achievement with Merit |
| The learner investigates biological material at the microscopic level by:* appropriately preparing three slides from a leaf epidermal tear and stem cross section of the cultivar ‘Cabernet Sauvignon,’ and yeast cells, for viewing under a light microscope

For example, the learner uses:* + a clean slide and coverslip, with few or no air bubbles, excess liquid is removed
	+ a correct stain where appropriate, sections are thin/flat.
* focusing the three prepared slides of biological material from two different plant tissues and a unicellular organism using a light microscope to enable the detail of the cell structures and components to be determined
* recording observations of biological material in at least **two** slides using the conventions for biological drawings
	+ the biological drawings follow accepted conventions, but may contain some errors in applying conventions or minor inaccuracies in representation

For example:Conventions include:* + an appropriate title that identifies the biological material
	+ an appropriate magnification used (e.g. 10 x 40 = X 400)
	+ is a pencil drawing, not sketchy, with clear bold lines
	+ no gaps between cells
	+ no shading, cross hatching, stipples, lines crossing over.

Representation includes:* + the biological drawing is consistent with the prepared slide of the biological materials viewed
	+ cells or components have recognisable shapes and are drawn in proportion
	+ typical organelles present in a cell.
* identifying observed specialised features and relating them to the function of the cells or tissues

For example, the learner:* + identifies and labels two observed specialised features in each of the biological drawings; specialised features may include arrangement of cells or cell types within a tissue, shape of a cell, and the presence or absence of a specific organelle or component, quantity or distribution of organelles within a cell (e.g. guard cells, chloroplasts, cell membrane, cell wall, xylem vessels, starch grains)
	+ relates the two identified specialised features to the function of the cells or tissues.

Annotated, biological drawings in context that come from previous and/or current learners, or have been developed by assessors/educators can be included as examples of evidence.*The above expected learner responses are indicative only and relate to just part of what is required.* | The learner investigates in-depth biological material at the microscopic level by:* appropriately preparing three slides from a leaf epidermal tear and stem cross section of the cultivar ‘Cabernet Sauvignon,’ and yeast cells, for viewing under a light microscope

For example, the learner uses:* + a clean slide and coverslip, with few or no air bubbles, excess liquid is removed
	+ a correct stain where appropriate, sections are thin/flat.
* focusing the three prepared slides of biological material from two different plant tissues and a unicellular organism using a light microscope to enable the detail of the cell structures and components to be determined
* recording observations of biological material in at least **two** slides using the conventions for biological drawings
	+ the biological drawings follow accepted conventions, but may contain some minor errors as long as they do not affect the accuracy of the representation of the biological material being viewed

For example:Conventions include:* + an appropriate title that identifies the biological material
	+ an appropriate magnification (e.g. 10 x 40 = X 400)
	+ is a pencil drawing, not sketchy, with clear bold lines
	+ no gaps between cells
	+ no shading, cross hatching, stipples, lines crossing over.

Representation includes:* + the biological drawing is consistent with the prepared slide of the biological materials viewed
	+ cells or components have recognisable shapes and are drawn in proportion
	+ typical organelles present in cell.
* identifying observed specialised features and relating them to the function of the cells or tissues

For example, the learner:* + identifies and labels two observed specialised features in each of the biological drawings; specialised features may include arrangement of cells or cell types within a tissue, shape of a cell, and the presence or absence of a specific organelle or component, quantity or distribution of organelles within a cell (e.g. guard cells, chloroplasts, cell membrane, cell wall, xylem vessels, starch grains)
	+ relates the two identified specialised features to the function of the cells or tissues.
* giving reasons for how or why each observed specialised feature contributes to the function(s) of the cell or tissue

Annotated, biological drawings in context that come from previous and/or current learners, or have been developed by assessors/educators can be included as examples of evidence.*The above expected learner responses are indicative only and relate to just part of what is required.* |

Final grades will be decided using professional judgement based on an examination of the evidence provided against the criteria in the Achievement Standard. Judgements should be holistic, rather than based on a checklist approach.