

Exemplar for Internal Achievement Standard Biology Level 2

This exemplar supports assessment against:

Achievement Standard 91160

Investigate biological material at the microscopic level

An annotated exemplar is an extract of student evidence, with a commentary, to explain key aspects of the standard. These will assist teachers to make assessment judgements at the grade boundaries.

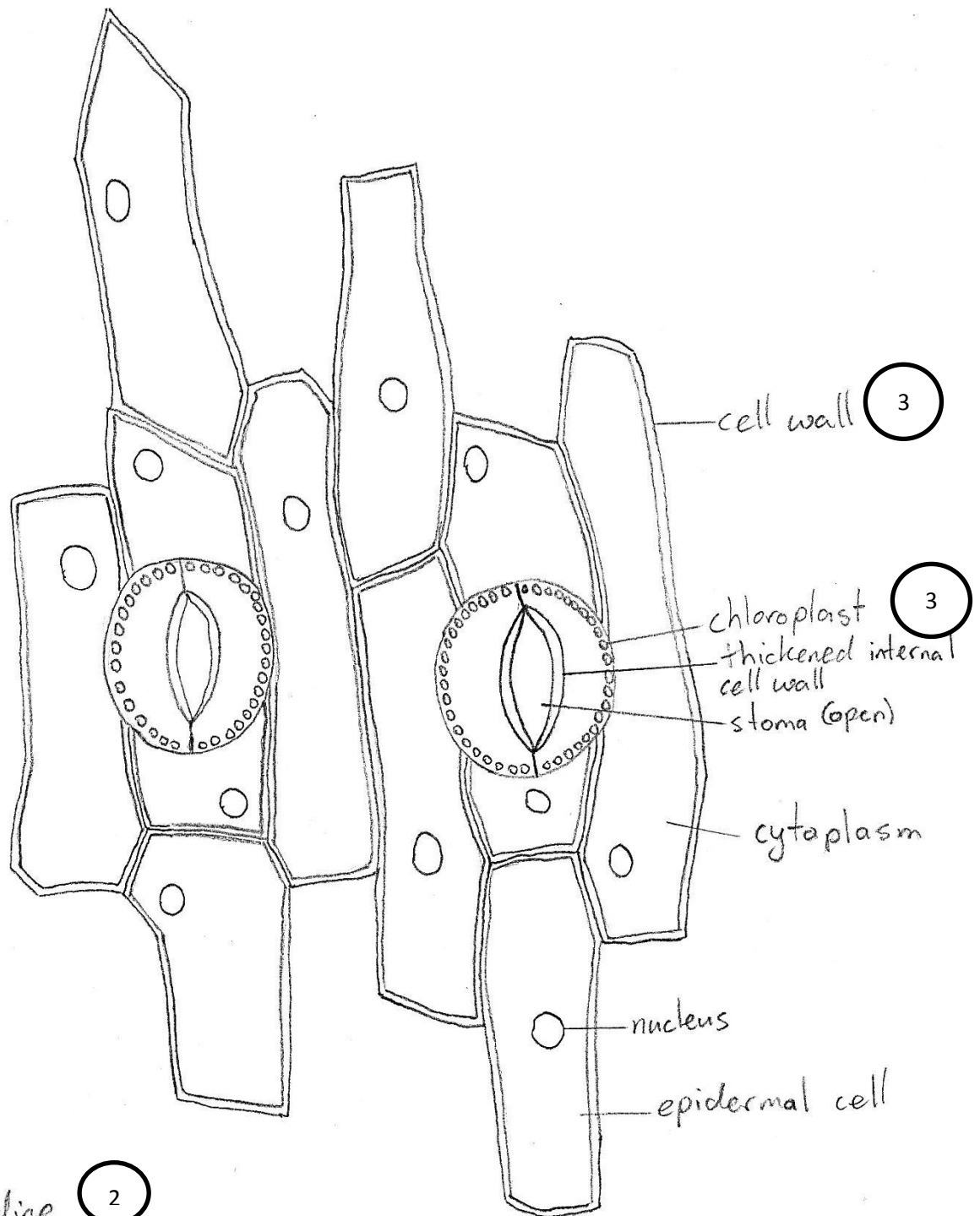
New Zealand Qualifications Authority

To support internal assessment from 2014

	Grade Boundary: Low Merit
3.	<p>For Merit, the student needs to investigate, in depth, biological material at the microscopic level.</p> <p>This involves giving reasons for how or why observed specialised features enable the cells to effectively carry out their specific function(s).</p> <p>Observations must include a recognisable shape, proportions, and typical organelles present in a cell, appropriate to the magnification. Biological drawings may contain some minor errors in applying conventions, as long as they do not affect the accuracy of the representation of the biological material being viewed.</p> <p>The student investigates <i>Tradescantia</i> in depth through the preparation and viewing of a slide, records their observations in a biological drawing with an appropriate title (1) and magnification (2), and follows accepted conventions to record observations that are consistent with the biological material being viewed (3).</p> <p>These include a recognisable shape, proportions and inclusion of typical organelles present in a cell. Some reasons for how or why the stomata and guard cells enable the cells of the leaf to effectively carry out their specific functions are provided (4).</p> <p>For a more secure Merit, the student would need to provide a more thorough explanation of how the guard cells function, to enable effective gas exchange in the leaf for plant processes like respiration and photosynthesis. For example, a more thorough explanation could identify the shape and thickened inner walls of the guard cells, and how or why changes result from changes in turgor pressure.</p>

Please note – This is an extract from a student's response for one of three biological drawings

Tradescantia Epidermal Leaf Tear (1)



Stain: iodine (2)
magnification: x400

The lower epidermis leaf cells of Tradescantia (wandering jew) leaves help to regulate gases that enter and leave the leaf.

The stomata are pores found mostly on the lower surface to absorb carbon dioxide for photosynthesis in the palisade cells, and release oxygen. They are opened and closed by the action of the guard cells. 4

The guard cells are pairs of cells surrounding the stomata and control the opening and closing of the stomata for gas exchange in the leaf. They also regulate water loss, like in hot, dry conditions when they close to avoid wilting and allowing the cells to carry out photosynthesis to produce glucose for respiration. 4

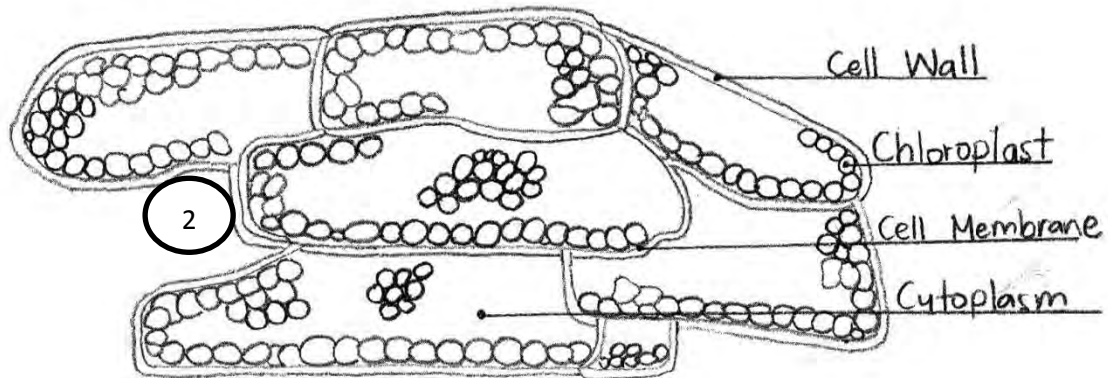
	Grade Boundary: High Achieved
4.	<p>For Achieved, the student needs to investigate biological material at the microscopic level.</p> <p>This involves:</p> <ul style="list-style-type: none"> • using a light microscope to prepare the biological material from two different plant tissues and one unicellular organism for viewing • viewing biological material using a light microscope to enable detail of cell structures and components to be determined • recording observations in biological drawings • identifying observed specialised features and relating them to the function of the cells or tissues. <p>Observations must include a recognisable shape, proportions, and typical organelles present in a cell, appropriate to the magnification. Biological drawings may contain some errors in applying conventions or minor inaccuracies in representation.</p> <p>The student investigates Elodea leaf cells through the preparation and viewing of a slide, records their observations in a biological drawing with an appropriate title and magnification (1), and identifies and relates chloroplasts and the cell wall to the function of the cells (3). There are some errors in following accepted conventions and representation (2), e.g. shared cells walls and cell shape.</p> <p>To reach Merit, the student's biological drawing would need to show fewer conventional errors that did not affect the accuracy of the representation of the Elodea cells being viewed.</p> <p>The student could also explain more thoroughly how or why the chloroplasts and cell walls enable the cells to effectively carry out their specific function(s). For example, a more thorough explanation could identify that Elodea cells have many chloroplasts near the edge. These contain chlorophyll to change the sun's energy to chemical energy (photosynthesis) which fuels the chemical reactions in the cells.</p>

Please note – This is an extract from a student's response for one of three biological drawings

Drawing of Elodea leaf cells

Magnification = $10 \times 10 = 100 \times$
 Stain: Iodine solution

1



Features: Where the ³ chloroplasts is, located right next to the cell wall this is because there is an chemical reaction this is where most of these chemical reaction usually occur - example when photothesis occurs. Plant cells have chloroplast this is because it contains, has green chlorophyll where this allows it to process photothesis. Also plant cells walls because this is to give the plant support and also its shape. In each there cell there was roughly about 30-42 chloroplast in the plants cells. We could not see, or identify the cell membrane this is because our magnification equipment was not strong enough

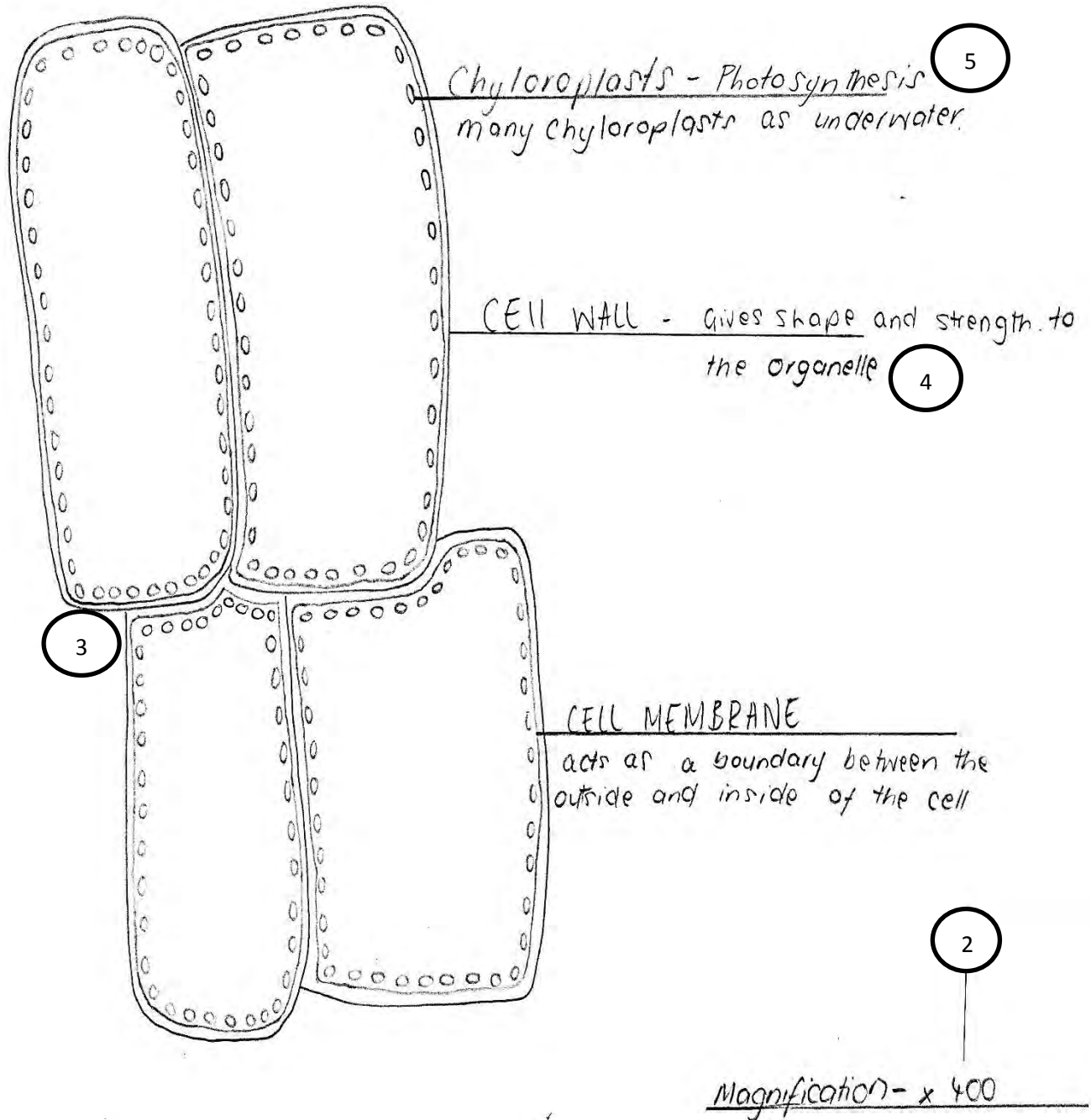
3

3

	Grade Boundary: Low Achieved
5.	<p>For Achieved the student needs to investigate biological material at the microscopic level.</p> <p>This involves:</p> <ul style="list-style-type: none"> • using a light microscope to prepare the biological material from two different plant tissues and one unicellular organism for viewing • viewing biological material using a light microscope to enable detail of cell structures and components to be determined • recording observations in biological drawings • identifying observed specialised features and relating them to the function of the cells or tissues. <p>Observations must include a recognisable shape, proportions, and typical organelles present in a cell, appropriate to the magnification. Biological drawings may contain some errors in applying conventions or minor inaccuracies in representation.</p> <p>The student investigates Elodea through the preparation and viewing of a slide, records their observations in a biological drawing with a title (1) and magnification (2), uses bold lines to show cells with a recognisable shape (3), and identifies the cell wall (4) and chloroplasts (5). Some evidence is provided relating these features to the function of the cells.</p> <p>For a more secure Achieved, the student would need to:</p> <ul style="list-style-type: none"> • show an appropriate title for the aspect of the material being viewed in the biological drawing, e.g. 'Elodea leaf cells' • provide more evidence relating the specialised features to the function of the cells, for example, identifying that Elodea cells have many chloroplasts near the edge for photosynthesis.

Please note – This is an extract from a student's response for one of three biological drawings

Biological Drawing of the Elodea (1)

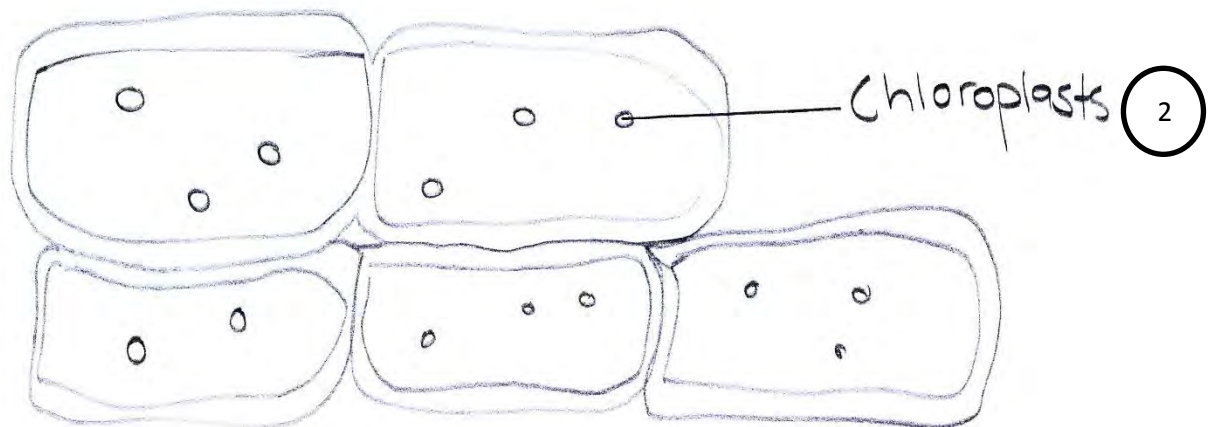


	Grade Boundary: High Not Achieved
6.	<p>For Achieved, the student needs to investigate biological material at the microscopic level.</p> <p>This involves:</p> <ul style="list-style-type: none"> • using a light microscope to prepare the biological material from two different plant tissues and one unicellular organism for viewing • viewing biological material using a light microscope to enable detail of cell structures and components to be determined • recording observations in biological drawings • identifying observed specialised features and relating them to the function of the cells or tissues. <p>Observations must include a recognisable shape, proportions, and typical organelles present in a cell, appropriate to the magnification. Biological drawings may contain some errors in applying conventions or minor inaccuracies in representation.</p> <p>The student investigates Elodea through the preparation and viewing of a slide, records their observations in a biological drawing, identifies the magnification used (1), identifies a chloroplast (2), and describes and relates the leaf's thinness to cell number (3) and the absence of a guard cells or stomata (4).</p> <p>To reach Achieved, the student's biological drawing would need to:</p> <ul style="list-style-type: none"> • use clear bold, unbroken lines • show an appropriate title for the aspect of the biological material being viewed, e.g. 'Elodea leaf cells' • provide more evidence relating observed specialised features to the function of the cells or tissues. For example, evidence could describe the role of chloroplasts in photosynthesis, and relate the leaf's thinness to the diffusion of gases.

Please note – This is an extract from a student's response for one of three biological drawings

Elodea leaf

100x magnification (1)



The leaves are 1-2 cells thick. The thin leaves (3) give them a high surface area to volume ratio.

(4) They are immersed in water which causes them to have no stomata or guard cells. They also have no internal transport system. The thinness allows ^{the} carbon dioxide, oxygen and other components required for cell processes