Government of **Western Australia**
School Curriculum and Standards Authority

SAMPLE ASSESSMENT TASKS

BIOLOGY
GENERAL YEAR 11

Sample assessment task

Biology – General Year 11

Task 5 – Unit 1

Assessment type: Science inquiry

Conditions
Period allowed for completion of the task: two weeks

- 10 days to set up the experiment, monitor and collect data
- One to two lessons will be set aside to write up this experiment. This will be done in class under invigilated conditions.

Task weighting
5% of the school mark for this pair of units

Respiration in seeds

Respiration occurs in all living things at all times of the day and night. It is a process that consumes a food source, in the presence of oxygen, and breaks it down to make carbon dioxide, water and energy. (Energy can be recognised through a change in temperature of the environment.)

During this activity you will investigate cellular respiration in seeds. As a result of this practical activity, you should be able to answer the following questions.

- Does an organism have to be alive to respire?
- What is the energy source for cellular respiration?
- How much carbon dioxide gas is produced through cellular respiration?
- How much heat energy is produced by cellular respiration?

Materials required (for a group)

- 2 x insulated flasks
- 1 kg of wheat seeds (pre-soaked in warm water for 8–12 hours)
- Bunsen burner
- tripod
- gauze mat
- bench protector
- 2 x large beakers
- 2 x sieves
- electronic balance
- cotton wool
- thermometers
- 2 x temperature sensors (optional)
- 2 x carbon dioxide sensors (optional)
- camera (optional)
- 2 x trays
- disposable gloves
- disposable hygienic masks

Method

1. Drain the pre-soaked wheat and weigh into two equal lots. Place into the two separate beakers.
2. Cover the wheat in the first beaker with cool water and leave on the bench to soak.
3. Cover the wheat in the second beaker with cool water, then heat to boiling. Once boiling point has been reached, simmer continuously for a period of five minutes.
4. Drain both beakers of wheat by pouring the contents through separate sieves.
5. Use the thermometer to find the temperature of the *unboiled wheat*. Rinse and wash the *boiled wheat* with cool water until the same temperature is established.
6. Place the *unboiled wheat* in one insulated flask (Flask A). Do not pack tightly. Plug the top of the flask with cotton wool, and place a thermometer into the centre of the flask.
7. Place the *boiled wheat* in the second flask (Flask B). Do not pack tightly. Plug the top of the flask with cotton wool, and place a thermometer into the centre of the flask.
8. Accurately label each flask (treatment, group names, date experiment started).
9. Monitor the temperature of the thermos flasks before school, at lunch and after school for the next 10 days.
10. If you have temperature and carbon dioxide sensors available for use, place one of these in each of the thermos flasks and attach to the computer.
11. At the conclusion of the monitoring period, empty the contents of each flask into separate trays. (Use gloves and a sterile mask for hygiene purposes.) Make observations of the condition of the wheat in each flask and record. Photographic evidence may be taken for your write-up.

    Work together as a group to generate a roster for who is responsible for taking each of the required observations.

GROUP ROSTER			
Date	**Before school**	**Lunch**	**After school**

Planning

1. Identify the following variables:

   (a) Independent (1 mark)

   _____

   _____

   (b) Dependent (1 mark)

   _____

   _____

   (c) Two controlled variables (2 marks)

   _____

   _____

2. Predict what you expect to find. How will the boiling of the wheat affect the level of cellular respiration that occurs in the wheat seeds? (1 mark)

   _____

   _____

   _____

3. Restate your prediction as a hypothesis. This should be a concise, testable statement that gives the relationship you expect to find between boiling of the wheat and its effect on the heat produced by respiration in the two flasks. (2 marks)

   _____

   _____

   _____

Results

4. In the space below, generate a suitable table to display all of your results. Take care to record all your data in the table. (4 marks)

In-class assessment

5. At the conclusion of the experiment, you looked at the condition of the wheat. You may have taken photos. Describe your observations. (4 marks)

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6. Graph your results on the grid provided. (6 marks)

Discussion

7. Provide answers to the following:

Unboiled wheat:

(a) Describe (using supporting data) the results that you gained during the experiment for the **unboiled** wheat. (2 marks)

(b) Outline a plausible explanation for your results. (4 marks)

(c) Describe evidence that supports your explanation. (2 marks)

Boiled wheat:

(d) Describe (using supporting data) the results that you gained during the experiment for the **boiled** wheat. (2 marks)

(e) Outline a plausible explanation for your results. (4 marks)

(f) Describe evidence that supports your explanation. (2 marks)

8. Estimate the amount of carbon dioxide that you would find in each of the flasks if you monitored the amount produced for the duration of the experiment.

(a) Show this as a sketched graph on the axis below (units of measurement not required). (2 marks)

(b) Provide an explanation. (2 marks)

Conclusion

9. Answer the following:

(a) Does an organism have to be alive to respire? Explain. (2 marks)

(b) What is the energy source for cellular respiration? Explain. (3 marks)

(c) Which flask produced the most heat energy over the first five days? Explain. (3 marks)

(d) Explain why the amount of heat produced in the flask containing boiled wheat increased during the latter part of the experiment. (3 marks)

(e) Does your data support, reject or have no relevance to your hypothesis? Explain. (3 marks)

Evaluation

10. Which aspects of the experiment would you recommend to change/improve if this experiment was run again? In the table below, choose **three** aspects and describe how each could be improved. (6 marks)

Aspect that could be improved	How could this be improved?
	_____ _____ _____
	_____ _____ _____
	_____ _____ _____

11. Your experiment had one control set-up (*the boiled wheat*) and one experimental set-up (*unboiled wheat*). Discuss how you could make the data collected more reliable. (2 marks)

_____

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Marking key for sample assessment task 5 – Unit 1

1. Identify the following variables:

   (a) Independent (1 mark)
   (b) Dependent (1 mark)
   (c) Controlled (two) (2 marks)

Description	Marks
(a) whether the wheat seeds have been boiled/not boiled	1
(b) temperature of the thermos flask	1
(c) Any two of the following: • equal mass of wheat seeds • starting temperature for boiled and unboiled wheat seeds • monitored at the same time/ same length of time • insulated flasks • kept in the same environment (classroom)	2
Total	**/4**

2. Predict what you expect to find. How will the boiling of the wheat affect the level of cellular respiration that occurs in the wheat seeds? (1 mark)

Description	Marks
Makes a prediction	1
Total	**/1**
Answer could include, but is not limited to:	
The flask temperature of the unboiled wheat will increase. The temperature of the unboiled wheat will decrease. The temperature of both flasks will remain the same.	

3. Restate your prediction as a hypothesis. This should be a concise, testable statement that gives the relationship you expect to find between boiling of the wheat and its effect on the heat produced by respiration in the two flasks. (2 marks)

Description	Marks
Unboiled wheat causes an increase in the temperature of the flask due to cellular respiration	1
Stated as a hypothesis	1
Total	**/2**

4. In the space below, generate a suitable table to display all of your results. Take care to ecord all your data in the table. (4 marks)

Description	Marks
Constructs appropriate table: • differentiates between boiled and unboiled wheat • independent variable in the first column/dependent variable in the second column • each column has correct heading (includes units)	1–3
Data: • sufficient data is recorded (i.e. three readings per day for 10 days)	1
Total	**/4**

5. At the conclusion of the experiment, you looked at the condition of the wheat. You may have taken photos. Describe your observations. (4 marks)

Description	Marks
Observations of unboiled wheat	1–2
Observations of boiled wheat	1–2
Total	**/4**

6. Graph your results on the grid provided. (6 marks)

Description	Marks
Constructs line graphs and labels correctly (or uses a key)	1
Chooses correct axes	1
Uses appropriate scales	1
Accurately plots points and joins appropriately	1
Accurately labels axes, including units	1
Uses an appropriate title showing relationship between two variables	1
Total	**/6**

7. Provide answers to the following:

(a) Describe (using supporting data) the results that you gained during the experiment for the **unboiled** wheat. (2 marks)

Description	Marks
States the trend in the data for unboiled wheat Relates the data to the observations of the wheat	1–2
Total	**/2**

(b) Outline a plausible explanation for your results. (4 marks)

Description	Marks
Soaking the seeds causes them to become active The seeds are respiring Heat is a by-product of the process Seeds germinate	1–4
Total	**/4**

(c) Describe evidence that supports your explanation. (2 marks)

Description	Marks
Increase in temperature Seeds have germinated	1–2
Total	**/2**

(d) Describe (using supporting data) the results that you gained during the experiment for the **boiled** wheat. (2 marks)

Description	Marks
States the trend in the data for boiled wheat Relates the data to the observations of the wheat	1–2
Total	**/2**

(e) Outline a plausible explanation for your results. (4 marks)

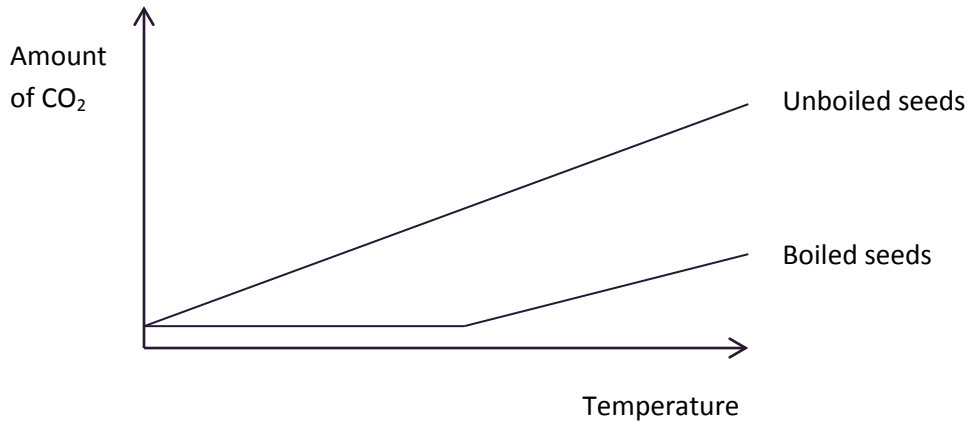
Description	Marks
Boiling the seeds kills the cells The seeds are not respiring/dead No reactions are occurring/no heat is produced Seeds show no signs of germinating/seeds have started to decompose/mouldy seeds	1–4
Total	**/4**

(f) Describe evidence that supports your explanation. (2 marks)

Description	Marks
No change/decrease in temperature Seeds have not germinated	1–2
Total	**/2**

8. Estimate the amount of carbon dioxide that you would find in each of the flasks if you monitored the amount produced for the duration of the experiment.

(a) Show this as a sketched graph on the axis below (units of measurement not required). (2 marks)



Description	Marks
Boiled wheat – CO_2 would increase as experiment progressed	1
Unboiled wheat – no CO_2 produced initially	1
Total	**/2**

(b) Provide an explanation. (2 marks)

Description	Marks
Boiled wheat – CO_2 produced by respiration would accumulate	1
Unboiled wheat – micro-organisms reproduce, the amount of CO_2 produced is small at first but as numbers grow it would increase	1
Total	**/2**

Conclusion

9. Answer the following:

(a) Does an organism have to be alive to respire? Explain. (2 marks)

Description	Marks
Yes	1
Respiration is one of the characteristics of living things	1
Total	**/2**

(b) What is the energy source for cellular respiration? Explain. (3 marks)

Description	Marks
Stored carbohydrates/lipids or (sun)light	1
Any two of the following: • wheat plant gains energy from the sun/light energy • through photosynthesis, produces sugars/carbohydrates/starch • lipids synthesised by the cell • seeds used as storage/provides energy for growth	1–2
Total	**/3**

(c) Which flask produced the most heat energy over the first five days? Explain. (3 marks)

Description	Marks
Flask A/flask with unboiled wheat	1
Any two of the following: • seeds start to germinate • energy required for growth comes from cellular respiration • heat is produced in cellular respiration	1–2
Total	**/3**

(d) Explain why the amount of heat produced in the flask containing boiled wheat increased during the latter part of the experiment. (3 marks)

Description	Marks
Decomposition	1
Micro organisms in the flask break down the wheat Heat is released as a result of the reactions/temperature of the flask rises	1–2
Total	**/3**

(e) Does your data support, reject or have no relevance to your hypothesis? Explain. (3 marks)

Description	Marks
Yes/no depending on hypothesis	1
States how the data supports, rejects or has no relevance to the hypothesis	1
Supports statement with relevant data	1
Total	**/3**

Evaluation

10. Which aspects of the experiment would you recommend to change/improve if this experiment was run again? In the table below, choose **three** aspects and describe how each could be improved. (6 marks)

Description	Marks
One mark for each aspect of the experiment that could be improved and one mark for the description (3x2)	1–6
Total	**/6**
Answer could include, but is not limited to:	
• Improve insulation of each thermos/maintain constant room temperature – to reduce heat loss to the environment • Keep flasks at room temperature before starting – so that both start at the same temperature • Take readings more often – more data helps to interpret the results • Set up more flasks/repeat the experiment – avoid mistakes/support results/avoid chance differences or anomalies	

11. Your experiment had one control set-up (*the boiled wheat*) and one experimental set-up (*unboiled wheat*). Discuss how you could make the data collected more reliable. (2 marks)

Description	Marks
Any one of the following: • Set up multiple flasks • Repeat the experiment	1
Reduce the possibility of chance events influencing results	1
Total	**/2**

Sample assessment task

Biology – General Year 11

Task 6 – Unit 1

Assessment type: Test

Conditions
Time for the task: 45 minutes

Task weighting
10% of the school mark for this pair of units

Test: Cell Processes

Multiple-choice **(10 marks)**

1. In a scientific experiment, a control is used to
   (a) keep all variables the same.
   (b) compare with an experimental group.
   (c) prove the experimental hypothesis.
   (d) increase repetition.

2. The concentration of phosphate ions in the soil is much lower than the concentration in the root cells of a plant. A phosphate ion enters a root cell by the process of
   (a) diffusion.
   (b) osmosis.
   (c) active transport.
   (d) endocytosis.

Questions 3 and 4 relate to an experiment that involves observing plant cells in various solutions.

3. Plant cells are placed in a glucose solution and observed under a microscope. Several minutes later, the plasma membrane in most cells has pulled away from the cell walls. Which statement most accurately explains this observation?
   (a) Water has diffused into the space between the cell wall and the plasma membrane.
   (b) Water has diffused out of the plant cells by osmosis.
   (c) Glucose has moved out of the plant cells by active transport.
   (d) Glucose has diffused into the space between the cell wall and the plasma membrane.

4. Several hours later, the plant cells look normal again. Which statement is most likely to be true?

   (a) Glucose has moved into the cell by active transport.

   (b) Glucose has diffused into the plant cells.

   (c) Water has diffused out of the plant cells.

   (d) Water has moved out of the plant cells by active transport.

Questions 5–7 relate to a student viewing a smear of red blood cells under a microscope.

5. The microscope is set with an ocular of 10X and an objective of 10X. To increase the magnification to 400X, the student should set the

   (a) ocular to 20X and the objective to 40X.

   (b) ocular to 20X and the objective to 15X.

   (c) objective to 20X and leave the ocular unchanged.

   (d) objective to 40X and leave the ocular unchanged.

6. When the magnification is increased to 400X, which of the following will increase?

   (a) resolution of the image

   (b) number of cells visible

   (c) diameter of the field of view

   (d) depth of the field of view

7. The student estimated the average diameter of the red blood cells to be 7.6 micrometres (µm). There are 1000 µm in 1 millimetre (mm).

   What is the average diameter of these cells in millimetres (mm)?

   (a) 0.76

   (b) 0.076

   (c) 0.0076

   (d) 0.00076

8. The rate of chemical reactions can be affected or inhibited by limiting factors. Which of the following factors would not limit the process of aerobic respiration?

   (a) light

   (b) oxygen

   (c) carbon dioxide

   (d) carbohydrate

The information below refers to Questions 9 and 10.

The table shows the surface area and volume of four cells of different sizes.

Cell	Surface area (mm^2)	Volume (mm^3)	Surface area/Volume
1	1.70	0.135	12.59
2	0.54	0.027	20
3	1.50	0.125	12
4	0.06	0.001	60

9. The cell that has the greatest surface area to volume ratio is

   (a) cell 1.

   (b) cell 2.

   (c) cell 3.

   (d) cell 4.

10. The diffusion of substances would be least efficient into

   (a) cell 1.

   (b) cell 2.

   (c) cell 3.

   (d) cell 4.

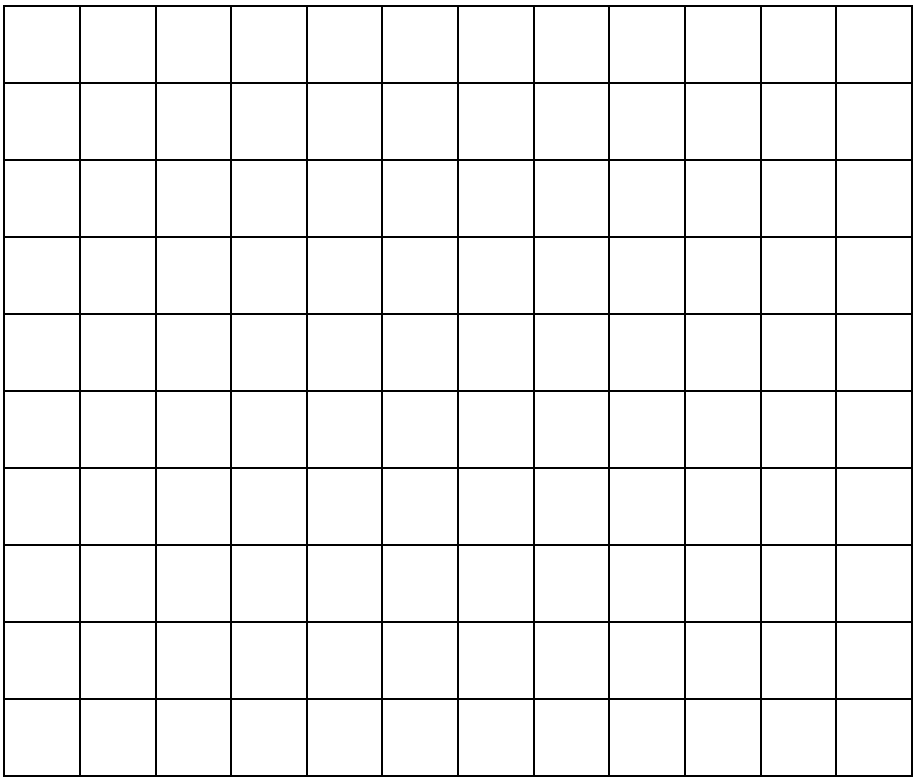
Short answer

Question 11 **(20 marks)**

A biologist conducted an experiment to test the effect of light intensity on the rate of photosynthesis in pondweed (a species of plant that lives in freshwater). The experiment involved exposing cuttings of pondweed to different light intensities for one hour. Light intensity was measured in arbitrary units, where the higher the value, the higher the light intensity. The amount of oxygen gas produced by the cuttings was recorded and used to indicate the rate of photosynthesis. The following table shows the results.

Light intensity (arbitrary units)	Oxygen production (µL)
No light (darkness)	1
5	3
10	5
15	No data
20	16
25	25
30	36
35	40
40	45
45	46
50	46
55	No data

(a) On the grid below, plot a graph of oxygen gas produced against light intensity. (6 marks)



(b) (i) Propose a suitable hypothesis for the experiment. (2 marks)

_____

_____

(ii) Identify the independent and dependent variables in the experiment. (2 marks)

Independent variable: _____

Dependent variable: _____

(iii) Name **two** different factors that would need to be controlled to ensure that the results of the experiment were valid. (2 marks)

One: _____

Two: _____

(c) (i) The biologist did not get any data for a light intensity of 15 or 55 arbitrary units. Use the graph to estimate the amount of oxygen produced at these two light intensities. (2 marks)

15 arbitrary units: _____

55 arbitrary units: _____

(ii) Which of the above estimates, 15 or 55 arbitrary units, is likely to be the more accurate? Give a reason for your answer. (2 marks)

_____

_____

_____

_____

(d) (i) Explain why the amount of oxygen gas produced by the pondweed can be used to indicate the rate of photosynthesis. (1 mark)

_____

_____

_____

_____

(ii) What do the results of the experiment suggest about the effect of light intensity on the rate of photosynthesis in pondweed? (2 marks)

_____

_____

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_____

(iii) In the experiment, the amount of oxygen produced was measured for only one pondweed cutting for each light intensity. The biologist therefore reasoned that it was important to repeat the experiment using different cuttings. Why was it important for the biologist to repeat the experiment? (1 mark)

Question 12 **(20 marks)**

(a) Draw a diagram to show the following structures of a plant cell: cell wall, cell membrane nucleus, mitochondrion, chloroplast, vacuole. (6 marks)

(b) State and describe the function of each of the following cell structures: (2 marks)

Nucleus _____

Cell membrane _____

(c) (i) Name the main process occurring in the mitochondrion and write a word equation for this process. (2 marks)

_____

_____

_____

(ii) Name the main process occurring in the chloroplast and write a word equation for this process. (2 marks)

_____

_____

_____

(d) Indicate whether each of the following statements about cells is true or false and give a reason for your answer.

(i) A cell that has a cell wall could be from a plant or an animal cell. (2 marks)

True / False

Reason: _____

_____

(ii) A cell with a vacuole must be from a plant. (2 marks)

True / False

Reason: _____

_____

(e) Cells may be prokaryotic or eukaryotic.

(i) List two differences between prokaryotic and eukaryotic cells. (2 marks)

_____

_____

_____

_____

(ii) Name a type of organism, multicellular or unicellular, that is comprised of one or more prokaryotic cells. (1 mark)

_____

(iii) Name an organism that is comprised of eukaryotic cells. (1 mark)

_____

Extended answer

Question 13 **(10 marks)**

Microscopes are essential for studying cells.

(a) Describe how you would prepare a piece of plant tissue for study under the light microscope. (5 marks)

(b) Describe how you would measure the diameter of the field of view and the size of the cells you can see using the microscope. (5 marks)

Marking key for sample assessment task 6 – Unit 1

Multiple-choice **(10 marks)**

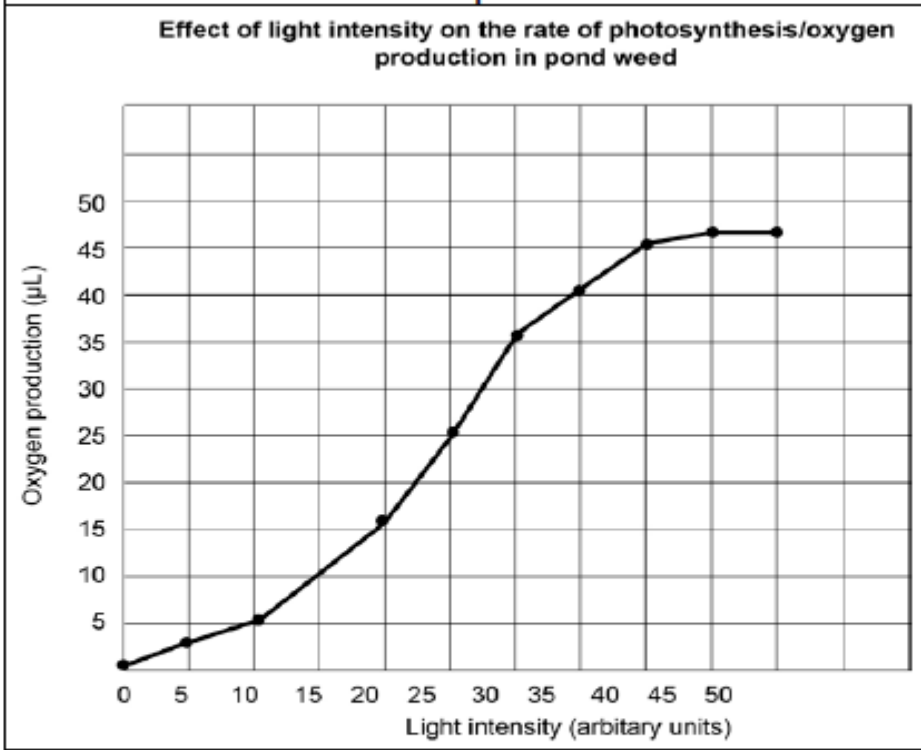
Question	Answer
1	b
2	c
3	b
4	b
5	d
6	a
7	c
8	a
9	d
10	c

Short answer

Question 11 **(20 marks)**

(a) On the grid below, plot a graph of oxygen gas produced against light intensity.

(6 marks)

Description	Marks
	

Description	Marks
Correct axes	1
Correct scale	1
Plotting – accurately plots points and joins appropriately	1
Labelling – accurate labels on both axes including units	1
Title – appropriate title that shows the relationship between two variables	1
Drawn as a line graph	1
Total	**/6**

(b) (i) Propose a suitable hypothesis for the experiment. (2 marks)

Description	Marks
Increasing light intensity increases the rate of photosynthesis/production of O_2/or the converse	1
Stated as a hypothesis	1
Total	**/2**

(ii) Identify the independent and dependent variables in the experiment. (2 marks)

Description	Marks
Independent variable: light intensity	1
Dependent variable: oxygen production	1
Total	**/2**

(iii) Name **two** different factors that would need to be controlled to ensure that the results of the experiment were valid. (2 marks)

Description	Marks
Any two of: • same temperature • same amount of cutting • similar cuttings (e.g. health, age) • same container/holding environment/depth/clarity of water • same amount of holding CO2 • same nutrients	1–2
Total	**/2**

(c) (i) The biologist did not get any data for a light intensity of 15 or 55 arbitrary units. Use the graph to estimate the amount of oxygen produced at these two light intensities. (2 marks)

Description	Marks
15: 10 µL (accept any in the range 9–11; must give units to get mark)	1
55: 46 µL (accept any in the range 45–47; must give units to get mark)	1
Total	**/2**

(ii) Which of the above estimates, 15 or 55 arbitrary units, is likely to be the more accurate? Give a reason for your answer. (2 marks)

Description	Marks
15	1
Interpolation/within the range of given data or 55 is extrapolation/beyond the range of the given data	1
Total	**/2**

(d) (i) Explain why the amount of oxygen gas produced by the pondweed can be used to indicate the rate of photosynthesis. (1 mark)

Description	Marks
Oxygen is an output of photosynthesis	1
Total	**/1**

(ii) What do the results of the experiment suggest about the effect of light intensity on the rate of photosynthesis in pondweed? (2 marks)

Description	Marks
Rate of photosynthesis increases as light intensity increases/rate of photosynthesis decreases as light intensity decreases	1
Rate declines/stabilises at high light intensities	1
Total	**/2**

(iii) In the experiment, the amount of oxygen produced was measured for only one pondweed cutting for each light intensity. The biologist therefore reasoned that it was important to repeat the experiment using different cuttings. Why was it important for the biologist to repeat the experiment? (1 mark)

Description	Marks
Any of the following: • increase reliability • reduce the possibility of chance events influencing results • cutting may have been abnormal/unusual	1
Total	**/1**

Question 12 **(20 marks)**

(a) Draw a diagram to show the following structures of a plant cell: cell wall, cell membrane nucleus, mitochondrion, chloroplast, vacuole. (6 marks)

Description	Marks
One mark for each of the following structures correctly drawn and labelled • cell wall • cell membrane • nucleus • mitochondrion • chloroplast • vacuole	1–6
Total	**/6**

(b) State and describe the function of each of the following cell structures: (2 marks)

Description	Marks
Nucleus: • controls cell function/determines which proteins are produced	1
Cell membrane: • contains cellular contents/regulates movement of substances into and out of the cell	1
Total	**/2**

(c) (i) Name the main process occurring in the mitochondrion and write a word equation for this process. (2 marks)

(ii) Name the main process occurring in the chloroplast and write a word equation for this process. (2 marks)

Description	Marks
(c) (i)	
Aerobic respiration (must specify aerobic)	1
Glucose + Oxygen → Carbon dioxide + Water + Energy (or ATP) (Chemical symbols acceptable)	1
(c) (ii)	
Photosynthesis	1
Carbon dioxide + Water + Energy (light energy/sunlight) → Glucose + Oxygen (Chemical symbols acceptable)	1
Total	**/4**

(d) Indicate whether each of the following statements about cells is true or false and give a reason for your answer.

(i) A cell that has a cell wall could be from a plant or an animal cell. (2 marks)

(ii) A cell with a vacuole must be from a plant. (2 marks)

Description	Marks
(d) (i)	
False	1
Only plants have a cell wall	1
(d) (ii)	
False	1
Both plant and animal cells have vacuoles	1
Total	**/4**

(e) Cells may be prokaryotic or eukaryotic.

(i) List two differences between prokaryotic and eukaryotic cells. (2 marks)

(ii) Name a type of organism, multicellular or unicellular, that is comprised of one or more prokaryotic cells. (1 mark)

(iii) Name an organism that is comprised of eukaryotic cells. (1 mark)

Description	Marks
(e) (i) Any two pairs from the list below (prokaryote cell mentioned first), one mark per pair, maximum two marks	
No membrane-bound nucleus/membrane-bound nucleus No nucleus/nucleus Circular DNA or plasmids/DNA in strands Smaller cells/larger cells No membrane-bound organelles/membrane-bound organelles	1–2
(e) (ii)	
Bacteria or blue-green algae/cyanobacteria	1
(e) (iii) Any clearly named organism that is not a bacterium or blue-green alga	1
Total	**/4**

Extended answer

Question 13 **(10 marks)**

Microscopes are essential for studying cells.

(a) Describe how you would prepare a piece of plant tissue for study under the light microscope. (5 marks)

Description	Marks
Any five of the following points: • slice tissue thinly • place tissue in a film of water/drop of stain/or just place tissue on a microscope slide • cover with a cover slip • use stain if looking for particular tissue • specific example of stain (e.g. iodine for starch) • specific example of staining technique (e.g. irrigating the slide)	1–5
Total	**/5**

(b) Describe how you would measure the diameter of the field of view and the size of the cells you can see using the microscope. (5 marks)

Description	Marks
• a reference grid is required (grid in eyepiece/grid on slide/calibrate with graph paper • must recalibrate for each different combination of eyepiece and objective • estimate cell size • count number of cells across field of view • divide diameter of field of view by the number of cells across	1–5
Total	**/5**

Sample assessment task

Biology – General Year 11

Task 8 – Unit 2

Assessment type: Extended response

Conditions
Time for the task: 20 minutes
This task will be conducted in class under invigilated conditions.

Task weighting
10% of the school mark for this pair of units

The surface area of a cell in contact with its surroundings is extremely important to its survival, and many life processes are dependent on activities associated with surfaces.

Describe, using a clearly labelled diagram, how the leaf of a plant is structured to maximise the surface areas for photosynthetic processes. (20 marks)

Marking key for sample assessment task 8 – Unit 2

The surface area of a cell in contact with its surroundings is extremely important to its survival, and many life processes are dependent on activities associated with surfaces.

Describe, using a clearly labelled diagram, how the leaf of a plant is structured to maximise the surface areas for photosynthetic processes. (20 marks)

Description	Marks
The following features are labelled: • palisade mesophyll/palisade cells/photosynthetic cells • epidermis • vein/vessel • spongy mesophyll/spongy cells • air spaces • stomate/stoma/stomata • guard cells • cuticle	1–8
Annotations on diagram/description with diagram for each of the following:	
• thin leaves • allows for maximum light penetration	1–2
• transparent epidermis • allows for maximum light penetration	1–2
• large number of veins • provides an extensive network of vessels supplying water and minerals	1–2
• spongy layer/extensive air spaces • provides a large surface area for gas exchange	1–2
• large number of photosynthetic/palisade cells close to the upper surface of the leaf • allows maximum light absorption	1–2
• stomata/openings in the leaf • allow for gas exchange	1–2
Total	**/20**