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Draw a cross through the box (☒) if you have NOT written in this booklet

NZQA

Mana Tohu Mātauranga o Aotearoa
New Zealand Qualifications Authority

Level 2 Biology 2024

91156 Demonstrate understanding of life processes at the cellular level

Credits: Four

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of life processes at the cellular level.	Demonstrate in-depth understanding of life processes at the cellular level.	Demonstrate comprehensive understanding of life processes at the cellular level.

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

You should attempt ALL the questions in this booklet.

If you need more room for any answer, use the extra space provided at the back of this booklet.

Check that this booklet has pages 2–12 in the correct order and that none of these pages is blank.

Do not write in the margins (////). This area will be cut off when the booklet is marked.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

QUESTION ONE: Cellular respiration

(a) Write the word equation **or** the chemical equation for aerobic respiration.

(b) *Phoneutria* is a genus of spiders mainly found in South America, commonly referred to as Brazilian wandering spiders.

The sensitive hairs on their bodies help detect vibrations of passing prey, and they can feed on insects, lizards, and frogs. During the day, they will hide for many hours under logs, rocks, or inside termite mounds and banana plants.

These spiders are known for their remarkable speed and agility, and are considered to be one of the fastest spiders in the world. When capturing prey or escaping from predators, they can move at speeds of up to 50 cm per second.

Brazilian wandering spider searching leaf litter for prey.

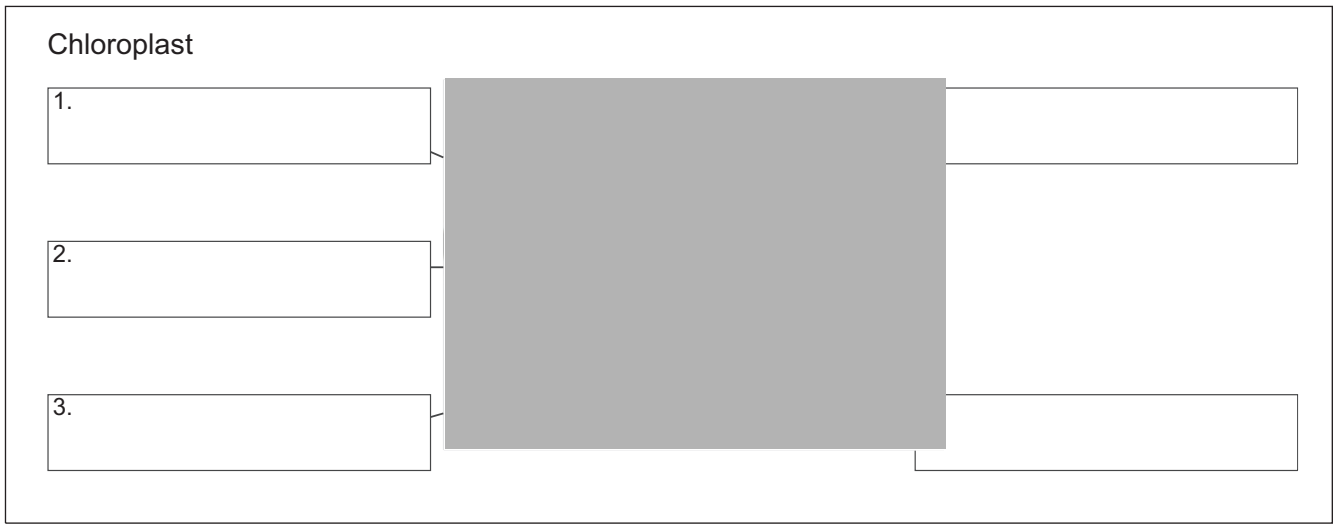
Discuss the processes of anaerobic and aerobic respiration, linking them to the activities of the Brazilian wandering spider.

In your answer, include discussion of:

- the processes of anaerobic respiration and aerobic respiration in the Brazilian wandering spider, including where in the cell each form of respiration takes place
- why the Brazilian wandering spider can only carry out anaerobic respiration for short periods of time when attacking or escaping
- the advantages and disadvantages associated with the Brazilian wandering spider using both anaerobic and aerobic respiration.

QUESTION TWO: Photosynthesis

(a) Label the key parts of the chloroplast in the diagram below.



Leaves of some plants that grow in the shade are known as ‘shade leaves’. These leaves can be up to five times more efficient in capturing and using the same amount of sunlight as plants whose leaves grow in direct sunlight, which are known as ‘sun leaves’.

Shade leaves lose water more quickly than sun leaves when all environmental conditions are the same. Shade leaves are generally larger in area but thinner than sun leaves. Shade leaves also tend to have larger chloroplasts, as well as more chloroplasts within each cell, compared to leaves that grow in full sunlight.

(b) With reference to the information above, evaluate how leaf structure, and the size and number of chloroplasts within plant cells, can be influenced by the availability of light.

In your answer, include discussion of:

- the process of photosynthesis, describing its key stages
- the correlation between the size and number of chloroplasts in shade leaves and sun leaves, and how this size and number difference is linked to photosynthesis
- why shade leaves would lose water more quickly than sun leaves under the same environmental conditions.

QUESTION THREE: Cell division

In both plants and animals, cells undergo a cycle of growth, followed by division.

Cell surface area to volume ratio.

Evaluate the impact of changes in the surface area to volume ratio on the diffusion process, and why changes in this ratio may trigger cell division.

In your answer, include discussion of:

- the process of diffusion and its role in cellular activities
- how and why the surface area to volume ratio undergoes changes during the growth of a cell
- how the surface area to volume ratio influences the movement of substances into and out of the cell
- the relationship between the surface area to volume ratio, diffusion, and the initiation of cell division, giving examples of when cell division rates are high in both plants and animals.

Extra space if required.
Write the question number(s) if applicable.

QUESTION NUMBER

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Acknowledgements
Material from the following sources has been adapted for use in this assessment:

Page 2
https://factanimal.com/brazilian-wandering-spider/

Page 5
https://pmgbiology.com/tag/2-22/

Page 8
https://www.slideshare.net/slideshow/cell-growth-and-mitosis/43434373