

91156



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have NOT written
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Level 2 Biology 2021

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 any cross-hatched area (///). This area may be cut off when the booklet is marked.

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

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The examination continues on the following page.**

QUESTION ONE: PHOTOSYNTHESIS

- (a) Photosynthesis occurs in the leaves of plants.

Describe the process of photosynthesis.

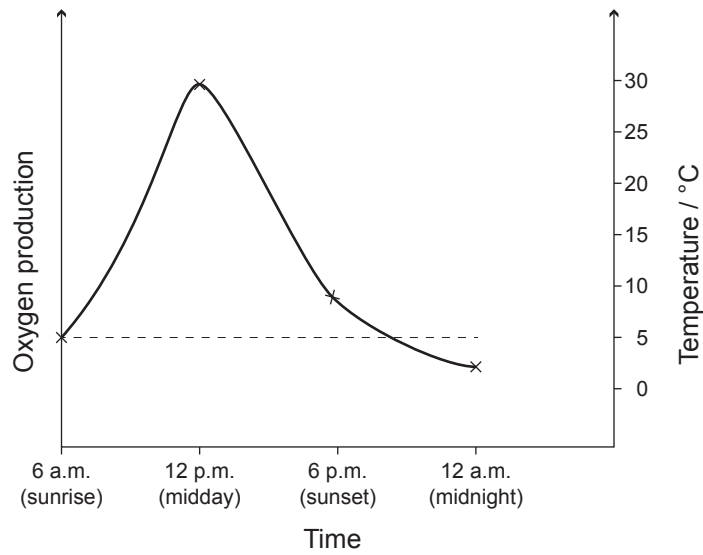


Source: www.sciencelearn.org.nz/events/928-thinking-like-a-vegetable-how-plants-decide-what-to-do

- (b) Water is an important requirement for the process of photosynthesis.

Explain how water enters a plant AND how it is used in the light-dependent reaction.

- (c) The diagram below shows a hypothetical plant over an 18-hour period where it is exposed to normal daily light intensity variation (i.e. increasing intensity from sunrise to midday, and decreasing intensity from midday to sunset).



Discuss reasons why the production of oxygen varies throughout the day.

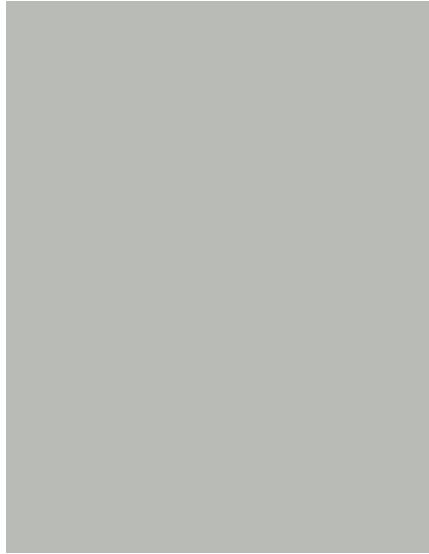
In your answer:

- explain why oxygen production is highest at midday and lowest at midnight
- explain why oxygen production is different at 6 a.m. and 6 p.m., even though light intensity is the same at these times
- discuss how light intensity, temperature, and ONE other factor affect oxygen production.

QUESTION TWO: CELL RESPIRATION

- (a) Cell respiration takes place in the mitochondria.

Label the following structures on the mitochondrion diagram below:
outer membrane, inner membrane, matrix, and crista.



Adapted from: www.sciencephoto.com/media/634423/view/mitochondrion-tem

- (b) The shortfin mako shark, *Isurus oxyrinchus*, is one of the fastest predatory fish in the world. When catching prey, it can swim at speeds up to 74 km h^{-1} for short periods of time.

Discuss where and when anaerobic and aerobic respiration occur in the mako shark.

In your answer:

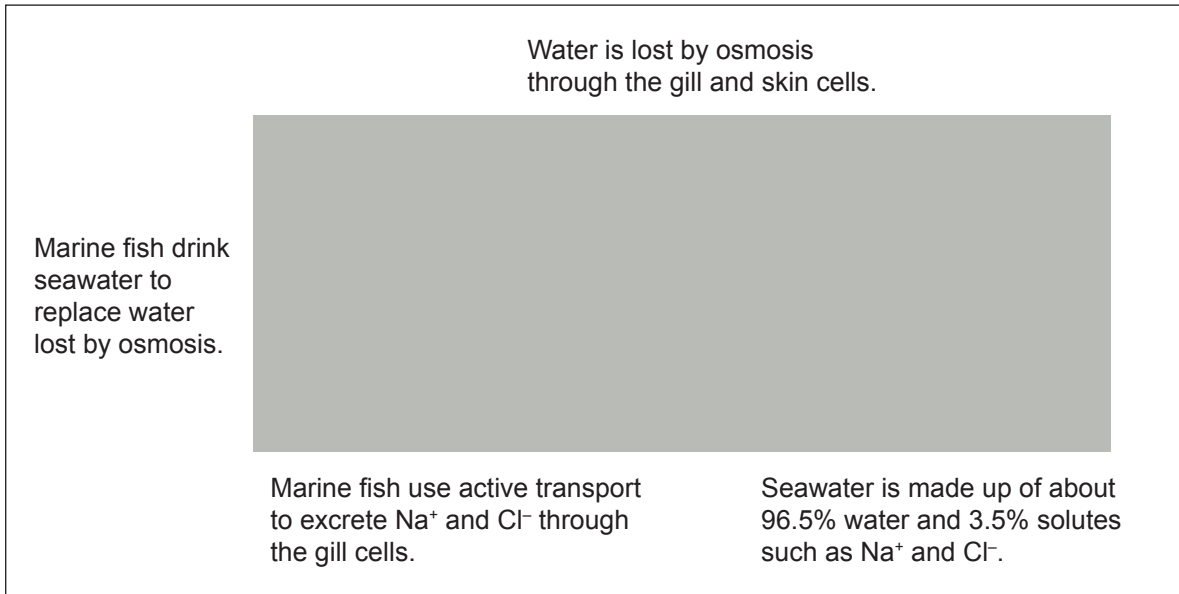
- explain anaerobic respiration and aerobic respiration in the mako shark's cells AND identify where each type of respiration occurs in an animal cell
- explain why the mako shark can only carry out anaerobic respiration for short periods of time
- discuss the advantages and disadvantages of the mako shark carrying out both anaerobic and aerobic respiration.



Source: <https://chinadialogueocean.net/9835-cites-worlds-fastest-shark-shortfin-mako/>

QUESTION THREE: MOVEMENT OF MATERIALS

Rāwaru or blue cod, *Parapercis colias*, is a marine fish that lives in saltwater. Rāwaru cells maintain a water concentration that is different from the surrounding seawater.



Adapted from: [https://en.wikipedia.org/wiki/Blue_cod#/media/File:Parapercis_colias_\(Blue_cod\).jpg](https://en.wikipedia.org/wiki/Blue_cod#/media/File:Parapercis_colias_(Blue_cod).jpg)

Use the simplified information above to discuss how rāwaru maintain a water concentration inside their cells that is different from the surrounding seawater.

In your answer:

- explain osmosis and why it occurs between the fish and seawater
- explain active transport and why it occurs between the gill cells and seawater
- discuss why the rāwaru must drink seawater, but also actively remove Na^+ and Cl^- from its body.

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

QUESTION
NUMBER

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