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QUALIFY FOR THE FUTURE WORLD
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Level 2 Biology, 2015

91156 Demonstrate understanding of life processes at the cellular level

9.30 a.m. Monday 16 November 2015
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 space for any answer, use the page(s) provided at the back of this booklet and clearly number the question.

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

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

TOTAL

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QUESTION ONE: RESPIRATION AND ENZYMES

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(a) Describe the purpose of cellular respiration, AND where it occurs in the cell.

(b) The eastern oyster's (*Crassostrea virginica*) habitat is the rocky shore, which experiences large changes in environmental temperature and oxygen concentration. This habitat can also contain heavy metals, such as cadmium.

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Eastern oyster (*Crassostrea virginica)*

http://www.bily.com/pnwsc/web-content/Family%20Pages/Bivalves%20-%20Ostreidae,%20Anomiidae.html

The eastern oyster's cellular respiration and enzyme activity are affected by environmental temperature, oxygen concentration, and cadmium.

Discuss how temperature, oxygen concentration, and cadmium can affect cellular respiration AND enzyme activity in the eastern oyster.

In your answer:

- describe the purpose of an enzyme
- explain how temperature and cadmium affect enzyme activity
- discuss how environmental temperature, oxygen concentration, and cadmium can affect the rate of cellular respiration in the eastern oyster.

You may use diagrams in your answer.

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There is more space for your answer to this question on the following page.

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QUESTION TWO: MOVEMENT OF MATERIALS

The lugworm (*Arenicola marine*) lives on sandy shores where the salt water concentration can fluctuate slightly. To survive in this habitat, the lugworm **passively** adjusts the salt water concentration of its body to match the surrounding seawater. Oxygen consumption remains constant during this process.

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http://marinebio.org/species.asp?id=57

The hogchoker (*Trinectes maculates*) lives in estuaries, where salt water concentration changes regularly. However, the hogchoker **actively** adjusts the salt water concentration of its body when in high salt concentration water. As salt concentration increases, oxygen consumption also increases.

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http://www.okeefes.org/Photo_Journal/Summer_2013/Summer_2013.htm

Discuss the movement of materials in the lugworm and hogchoker cells, and how oxygen consumption affects these processes.

In your answer:

- describe diffusion, osmosis, and active transport
- explain how salt water moves across the cell membrane in a lugworm via osmosis and facilitated diffusion
- explain how salt water moves across the cell membrane in a hogchoker via osmosis and active transport
- discuss why oxygen consumption remains constant in the lugworm, whereas oxygen consumption increases in the hogchoker as salt water concentration increases, and link this to the life process of cellular respiration.

You may use diagrams in your answer.

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QUESTION THREE: PHOTOSYNTHESIS

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Photosynthesis occurs in the chloroplasts, and requires light energy.

(a) Draw a diagram of a chloroplast, labelling the outer membrane, inner membrane, stroma, and thylakoid.

(b) Biologists have found that chloroplasts can move within the cell in response to light availability, and that shade plant chloroplasts are bigger than non-shade plant chloroplasts.

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http://www.shutterstock.com/video/clip-3943691-stock-footage-chloroplasts-in-the-living-plant-cells-under-microscope-magnification-x-phase-contrast.html

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Discuss why plants found in shady areas have bigger chloroplasts, and explain how chloroplast distribution within the cell can be influenced by light availability.

In your answer:

- explain the process of photosynthesis
- explain why chloroplasts move within a cell due to light availability
- discuss why plants found in shady areas have bigger chloroplasts than plants found in non-shady areas, and how this relates to photosynthesis.

There is more space for your answer to this question on the following page.

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

QUESTION NUMBER

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