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Level 2 Biology 2020

91156 Demonstrate understanding of life processes at the cellular level

9.30 a.m. Wednesday 2 December 2020
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: CELLULAR RESPIRATION

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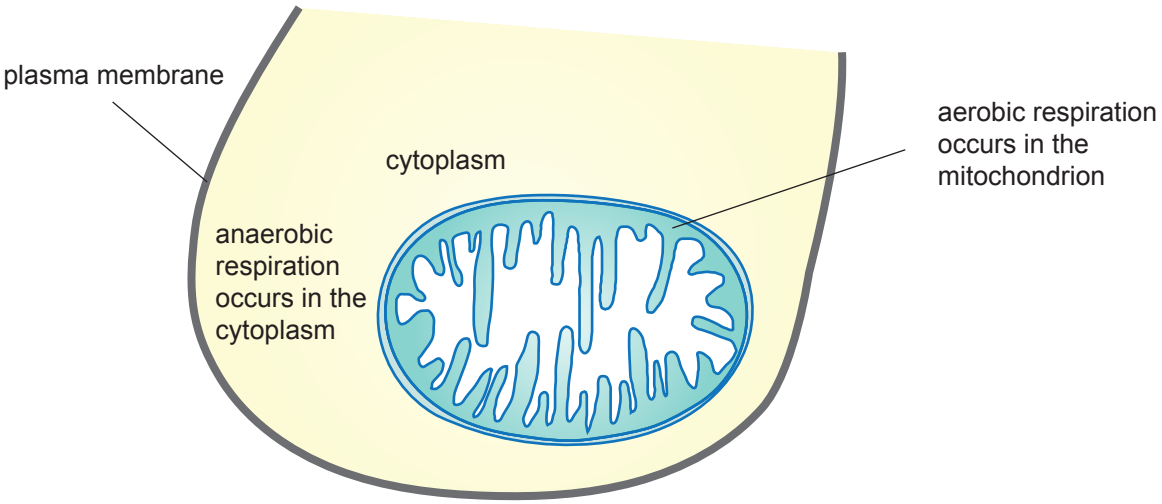

(a) Write the word equation for aerobic respiration.

(b) Aerobic respiration occurs in the mitochondria, while anaerobic respiration occurs in the cytoplasm. Cyanide is an inhibitor of the enzyme cytochrome c oxidase, an important enzyme in the aerobic respiration process.

Discuss how cyanide would affect both anaerobic and aerobic respiration, and the production of ATP.

In your answer:

- describe the function of an enzyme
- explain how an enzyme's structure allows it to carry out its function
- discuss how enzyme inhibitors affect enzyme function and biological reactions.

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QUESTION TWO: PHOTOSYNTHESIS AND MOVEMENT OF MATERIALS

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Freshwater aquatic plants and animals are able to absorb water and dissolved gases directly from the water into their cells.

Source: https://www.britannica.com/plant/Elodea

Source: https://microdok.com/what-is-a-cell/

(a) Explain how water enters both plant AND animal cells.

(b) Explain why animal cells may burst when placed in fresh water, but plant cells will not.

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The examination continues on the following page.

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Elodea cells in tapwater (× 400)
Source: www.britannica.com/plant/Elodea

Diagram of a chloroplast
Source: https://vk.com/prepsatchembio

(c) Discuss how the structures within the plant cell work together to maximise photosynthesis.

In your answer include:

- the word equation for photosynthesis
- an explanation of the effect of chloroplast location on photosynthesis
- a discussion of how the structure of the chloroplast maximises photosynthesis, with reference to the light-dependent and light-independent phases.

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QUESTION THREE: CELL CYCLE, DNA REPLICATION, AND MITOSIS

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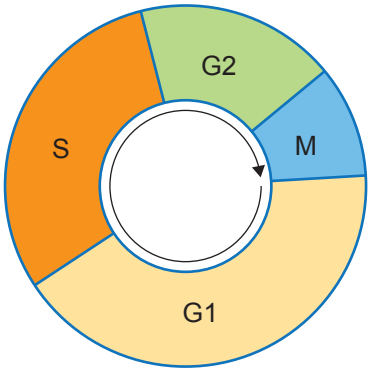
The life cycle of a cell is called the cell cycle. Stages G1, S, and G2 are described below. Mitosis is also part of the cell cycle.

Cell cycle



Key	
G1	cell growth and cell activities
S	DNA replication
G2	cell growth and preparation for mitosis
M	mitosis

Adapted from: https://teachmephysiology.com/basics/cell-growth-death/cell-cycle/

Discuss why mitosis and DNA replication are necessary to support both the overall functioning of the cell, and the growth of the organism.

In your answer, refer to specific examples and include:

- a description of the purpose of DNA replication
- an explanation of why the DNA must be replicated before mitosis
- an explanation of the purpose of mitosis AND cell size
- a discussion of how the cell cycle affects the growth of an organism.

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