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## BIOLOGY VCE UNITS 3&4 DIAGNOSTIC TOPIC TESTS 2017

### TEST 3: PHOTOSYNTHESIS AND CELLULAR RESPIRATION

TOTAL 40 MARKS (45 MINUTES)

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Student's Name: \_\_\_\_\_ Teacher's Name: \_\_\_\_\_

#### Directions to students

Write your name and your teacher's name in the spaces provided above.  
Answer all questions in the spaces provided.

#### SECTION A – MULTIPLE-CHOICE QUESTIONS

##### Instructions for Section A

Choose the response that is **correct** or that **best answers** the question.

A correct answer scores 1; an incorrect answer scores 0.

Marks will **not** be deducted for incorrect answers.

No marks will be given if more than one answer is completed for any question.

Unless otherwise indicated, the diagrams in this booklet are **not** drawn to scale.

#### Question 1

On the diagram below, which structure is labelled X?



- A. matrix
- B. stroma
- C. cristae
- D. grana

*Use the following information to answer Questions 2 and 3.*

Over the Christmas break, tortoise tanks in the Biology lab were untended. As a result, the water now has a green organism growing in it, which appears to be growing very well in the sun and producing bubbles of gas.

**Question 2**

These bubbles are most likely

- A. oxygen.
- B. carbon dioxide.
- C. swamp gas.
- D. methane.

**Question 3**

Using an electron microscope to view the organism, inside the cells of this organism you see several structures, including a nucleus. You also see small, green organelles approximately five microns across. Focussing on these organelles, you see that their internal structure consists of many flattened, disc-like structures arranged in stacks.

The green pigment you see lining these structures is most likely

- A. chlorophyll a.
- B.  $\beta$  carotene.
- C. photosystem II.
- D. chlamydia.

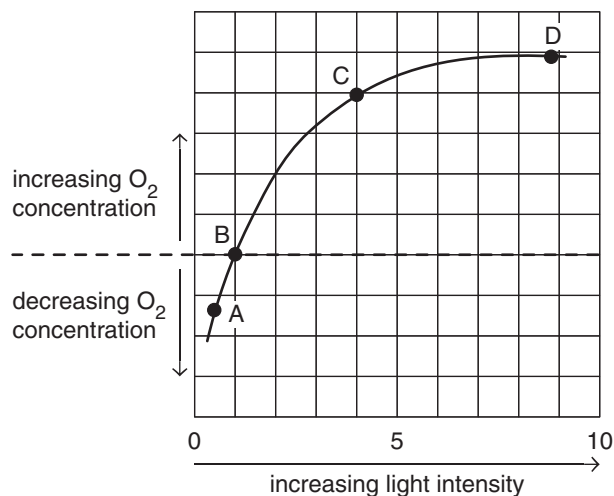
**Question 4**

Photosynthesis can best be summarised as the process in which

- A.  $\text{CO}_2$  is oxidised using  $\text{O}_2$  provided by the photolysis of  $\text{H}_2\text{O}$ .
- B. glucose is produced using the energy stored in  $\text{H}_2\text{S}$ .
- C. inorganic carbon is reduced to a high-energy organic compound.
- D. ATP is produced using energy from the sun.

**Question 5**

The following graph shows relative  $O_2$  concentrations in the water surrounding a piece of *Elodea* pondweed.



Which of the following is correct?

- A. At point A, the concentration of  $CO_2$  is dropping.
- B. At point B, the rate of photosynthesis is balanced by the rate of respiration.
- C. At point C, the rate of respiration is higher than the rate of photosynthesis.
- D. At point D,  $O_2$  production has stopped.

**Question 6**

Photosynthesis is separated into two separate stages; the light-dependent and the light-independent reactions.

Which of the following most accurately lists the inputs and outputs of the light-dependent reaction?

	<b>Inputs</b>	<b>Outputs</b>
A.	light, $H_2O$ , NAD, ADP + Pi	NADH, ATP, $O_2$
B.	light, $H_2O$ , NADP, ADP + Pi	NADPH, ATP, $O_2$
C.	light, $CO_2$ , ATP, NADPH	$C_6H_{12}O_6$ , NADP, ADP + Pi
D.	$H_2O$ , ATP, NADPH	$C_6H_{12}O_6$ , NADP, ADP + Pi

**Question 7**

ATP is essential to every living cell because

- A. it captures energy from the breakdown of glucose and ADP.
- B. exergonic and endergonic reactions could not take place without it.
- C. it stores energy in a form that is instantly available to the cell.
- D. it stores energy released during the breakdown of ADP.

**Question 8**

Cellular respiration is best described as

- A. the intake of carbon dioxide and output of oxygen by cells.
- B. the excretion of waste products.
- C. the inhalation of oxygen and exhalation of carbon dioxide.
- D. a series of metabolic reactions during which ATP is produced.

**Question 9**

Which of the following is the correct sequence of stages for aerobic cellular respiration?

- A. glycolysis, citric acid cycle, electron transport
- B. glycolysis, citric acid cycle, fermentation
- C. glycolysis, electron transport, citric acid cycle
- D. citric acid cycle, fermentation, electron transport

**Question 10**

During electron transport, the energy that is released as electrons pass along a series of carrier molecules is used to make

- A. ATP.
- B. NADH.
- C. NAD<sup>+</sup>.
- D. ADP.

**Question 11**

Aerobic respiration requires

- A. carbon dioxide.
- B. heat energy.
- C. oxygen.
- D. water.

**Question 12**

Respiration always involves

- A. oxidation of fats.
- B. oxidation of proteins.
- C. production of ATP.
- D. production of lactic acid.

**Question 13**

In photosynthesis, the second reaction/step is also known as the

- A. Krebs cycle.
- B. citric acid cycle.
- C. Calvin cycle.
- D. carbon cycle.

**Question 14**

Carotenoids and chlorophylls

- A. are pigments.
- B. absorb photons of light at all wavelengths.
- C. are found in xylem vessels.
- D. are temperature regulators.

**Question 15**

Which of the following statements accurately describes the relationship between photosynthesis and cellular respiration?

- A. Photosynthesis uses light energy to convert inorganic substances to energy-rich organic substances, whereas cellular respiration breaks down energy-rich organic substance to synthesise ATP.
- B. Photosynthesis occurs only in autotrophs, whereas cellular respiration occurs only in heterotrophs.
- C. Photosynthesis involves the oxidation of glucose, whereas cellular respiration involves the reduction of CO<sub>2</sub>.
- D. The primary function of photosynthesis is to use light energy to synthesise ATP, whereas the primary function of cellular respiration is to break down ATP and release energy.

**SECTION B – SHORT-ANSWER QUESTIONS**

**Instructions for Section B**

Answer **all** questions in the spaces provided. Write using blue or black pen.  
Unless otherwise indicated, the diagrams in this booklet are **not** drawn to scale.

**Question 1** (3 marks)

Explain the role of ATP in cells, where it is produced and where it is used.

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**Question 2** (3 marks)

Describe **three** environmental factors that affect the rate of photosynthesis.

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**Question 3** (1 mark)

Energy is converted from what type to what type during photosynthesis?

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**Question 4** (4 marks)

Describe **two** stages of photosynthesis and the locations where these stages occur.

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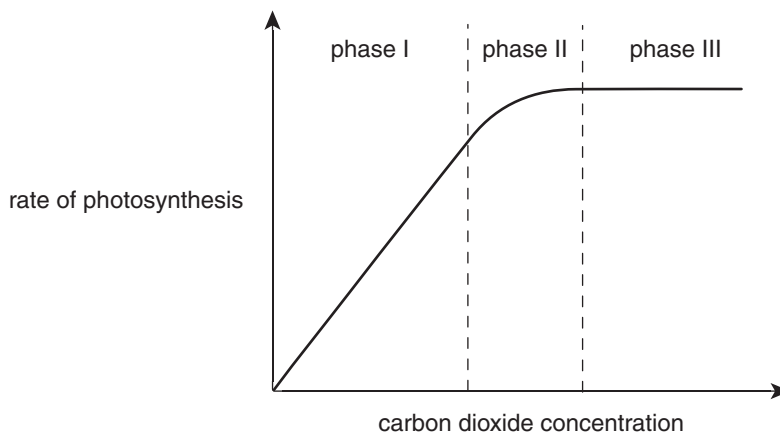
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**Question 5** (2 marks)

The diagram below shows the relationship between rate of photosynthesis and carbon dioxide concentration.



**a.** In which phase is photosynthesis limited by carbon dioxide concentration? 1 mark

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**b.** What could be limiting the rate of photosynthesis in phase III? 1 mark

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**Question 6** (4 marks)

Tomatoes can be grown inside a greenhouse or outside in the garden.

- a.** Give **two** advantages of growing tomatoes inside a greenhouse. (Relate your answers to photosynthesis.) 2 mark

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- b.** Give **one** disadvantage of growing tomatoes inside a greenhouse. 1 mark

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- c.** Explain why extra carbon dioxide added to the air in a greenhouse increases the tomato crop. 1 mark

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**Question 7** (1 mark)

Explain why aerobic respiration is said to be more efficient than anaerobic respiration.

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**Question 8** (2 marks)

Name the locations where aerobic and anaerobic respiration occur in the cells.

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**Question 9** (2 marks)

Name the specific locations of the Krebs cycle and electron transport.

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**Question 10** (1 mark)

Explain why all cells do not contain the same number of mitochondria.

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**Question 11** (2 marks)

A tuna fish is a very active hunter. Although fish are described as cold-blooded, the tuna fish's body temperature is usually a few degrees higher than the water around it.

Provide an explanation for this phenomenon.

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