

## **CAPE Biology**

### **Unit 1 Paper 02**

#### **Question 4**

##### Comments

Very good answer overall, demonstrating that the candidate has a sound knowledge of the subject material and an excellent understanding of what the question required. For example, complete descriptions of the structures common to both a mitochondrion and a chloroplast were given. Also, the candidate used his or her knowledge of the process of photosynthesis and respiration to discuss the difference in the main function of the respective organelles. An excellent response was given for the second part of the question and it was evident that there was a sound understanding of the difference between a tissue and an organ.

SECTION B

Answer ALL questions.

Write your answers in the spaces provided at the end of each question.

4. (a) (i) Describe THREE structures which are common to a mitochondrion and a chloroplast.  
70S ribosomes, circular DNA, double membrane. [6 marks]
- (ii) Discuss how a mitochondrion differs from a chloroplast with respect to their MAIN function in a cell. *chloroplast assimilates CO<sub>2</sub> at low light intensities in the process of photosynthesis*  
*mitochondrion is the producer of energy in cell through production of ATP from ADP and inorganic phosphate* [4 marks]
- (b) Explain, using the dicotyledonous root as an example, the difference between a 'tissue' and an 'organ'. [5 marks]

Total 15 marks

Write the answer to Question 4 here.

ai) The mitochondria and the chloroplasts are eukaryotic cells which have evolved from the older prokaryotic cells. This is supported in the endosymbiont theory which stipulates that these two structures were one prokaryotes before they developed into eukaryotes as they both possess of both prokaryotes and eukaryotes, common structures which support this theory. Structures common to both mitochondria and chloroplasts include small 70s ribosomes, the presence of a circular DNA lying freely in their cytoplasm and they both have a double membrane. The 70s ribosomes are small structure found dispersed throughout the cytoplasm. They are the manufactures of

GO ON TO THE NEXT PAGE

Write the answer to Question 4 here.

proteins and lipids within both the chloroplasts and mitochondria. Mitochondria and chloroplasts possess circular DNA ~~is~~ lying freely within their cytoplasm. This circular DNA controls all the activities taking place in ~~these~~ these structures. The chloroplast and mitochondria both possess double membranes enclosing and confining the contents of these structures. These structures are:

ii) Mitochondria is the manufacturer <sup>and</sup> ~~of~~ <sup>energy</sup> supplier of energy to all parts of the cell. The mitochondria manufactures ATP (adenosine triphosphate) from ADP and Phosphate. The mitochondria <sup>sends</sup> ~~uses~~ the ATP ~~and~~ made ~~and~~ to the other parts of the so that they can carry out their metabolic reactions such as respiration. ~~so that glucose~~ The chloroplast on the other hand ~~is~~ is the site of photosynthesis in plants. The chloroplast traps ~~all~~ sunlight in the light dependent ~~stated~~ to produce NADPH. The energy required to carry out this function of ~~producing~~ photosynthesizing is supplied to the <sup>chloroplast</sup> ~~mitochondria~~ by the mitochondria and energy is needed to produce oxygen and glucose. 
$$6H_2O + 6CO_2 \xrightarrow[\text{chlorophyll}]{\text{light}} C_6H_{12}O_6 + 6O_2$$
 Thus the main function of the mitochondrion is to provide the cell with energy in the form of ATP and the main function of the chloroplast is to allow for photosynthesis in plants.

Write the answer to Question 4 here.

b) A tissue is a group of cells working together to perform the same function whereas an organ is a group of tissues working together to carry out a function. In the <sup>particular</sup> dicotyledonous root the tissues present are phloem tissues, xylem tissues, cells of the cortex, cells of the endodermis and cells of the epidermis. The epidermal cells are those found on the outer surface of the cell which regulates the uptake of water and minerals and also prevents the loss of water and minerals from the root. The cells of the endodermis prevents the loss of water. The cortex cells are a bundle of cells which form a protective layer around the cells of the xylem and phloem. The xylem tissue is made up of many cells which aid in the transport of water from the root up to the stem and thus to other parts of the plant. The xylem tissues only transports water and mineral salts. The phloem tissue transports food and mineral salts from the roots up to the stems through phloem sieve tubes. The phloem tissue is made up of phloem cells which carry out the function of transporting minerals and food up to the plant through ~~pleem~~ phloem sieve tubes. The entire system of cells make up this organ of the dicotyledonous where the tissues transport different substances but they make up the root which does all these things of transporting water and mineral salts / ions and food to the plant.

GO ON TO THE NEXT PAGE