



Apex Grammar School O & A Level Evening Classes

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## **‘O’ Level Power Revision Series**

Biology - Cells and Nutrition

### **EVALUATION TEST PAPER**

**REAL EXAMINATION QUESTIONS**  
for Upper Secondary 3 & 4

**Name:** \_\_\_\_\_

**Time Start:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**Time End:** \_\_\_\_\_

**Total Marks :**

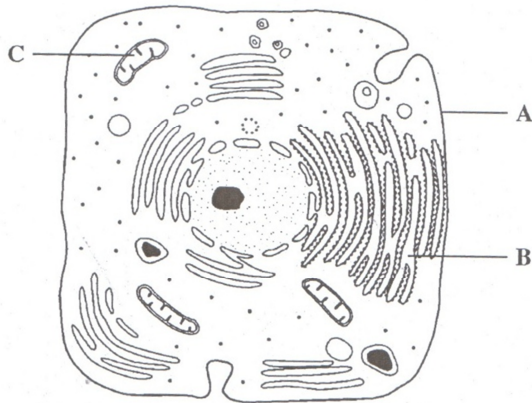
**/40**

6 questions

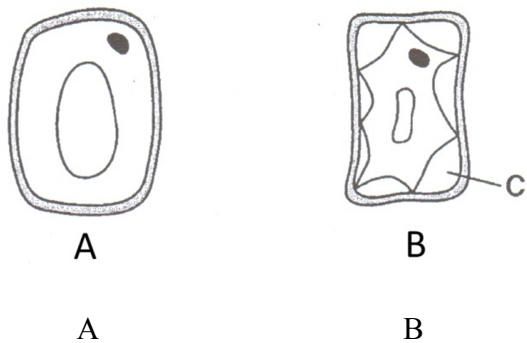
**Total time: 45 min**

**DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO. FOLLOW ALL INSTRUCTIONS CAREFULLY.**

1. The diagram shows the detailed structure of an animal cell.



- (a)
- (i) Identify the structures labelled A and B. [2]
- (ii) Identify structure C and name the process that takes place in this structure. [2]
- (b) State two structures that are found in plant cells but not in the cell shown above. [2]
2. A cell was placed in solution A for ten minutes. The cell was then transferred to solution B for another ten minutes.



- (a) Explain what has occurred to cause the cell to appear as it does in A. [3]
- (b) Compared with the water potential of the cell, what can be deduced about solutions A and B? [2]
- (c) What will be found in region C at the end of the experiment? Explain your answer. [2]
3. (a) Explain why osmosis may be considered to be a special type of diffusion. [3]

- (b) Describe and explain the effects of placing into pure water [6]  
 (i) a plant cell  
 (ii) an animal cell.
4. Describe how the activity of a digestive enzyme is affected by temperature. [4]
5. Explain what is meant by the following terms: [7]  
 (i) ingestion  
 (ii) digestion  
 (iii) absorption
- (b) Where, in a mammal, are the following substances stored, and what part does each play in a mammal's metabolism? [5]  
 (i) Carbohydrates  
 (ii) Fats
6. Describe the effects of increasing light intensity on photosynthesis. [2]

Answers:

1.  
 (a)(i) A – cell membrane, B – endoplasmic reticulum  
 (a)(ii) Mitochondrion, respiration.  
 (b) Cell wall, chloroplasts.
2.  
 (a) Water entered the cell by osmosis as solution A has a higher water potential than the cell sap. The vacuole exerts turgor pressure on the cell wall, which in turn exerts wall pressure to prevent the cell from bursting. The cell is fully turgid.  
 (b) Solution A has a higher water potential/ is less concentrated than the cell sap.  
 Solution B has a lower water potential/ is more concentrated than the cell sap.  
 (c) Solution B will be present in region C as the cell wall is fully permeable, allowing solution B to enter and occupy the space.

3.

(a) Diffusion is the movement of molecules down a concentration gradient. Osmosis is the movement of water molecules down a concentration gradient through a partially permeable membrane. It is the movement of water molecules only through a partially permeable membrane, hence it can be considered a special type of diffusion.

(b)(i) The water potential of the plant cell is lower than the water potential of pure water, hence water enters the plant cell by osmosis. The vacuole increases in size and exerts turgor pressure against the cell wall. The cell wall in turn exerts wall pressure to keep the plant cell from bursting. Hence the plant cell will become fully turgid, preventing more water from entering.

(b)(ii) As the water potential of the animal cell is lower than that of pure water, water enters the animal cell by osmosis. If too much water enters the animal cell, it will burst as it does not have a cell wall to exert wall pressure and prevent more water from entering.

4.

Increase in temperature will increase the activity of the enzyme up to a certain limit which is 40°C. At lower temperatures, the rate of reaction will be low. Above 40°C, the enzyme is denatured, thus the rate of reaction decreases and is zero around 60°C as enzymes are not able to function.

5.

(a)(i) Taking in of food into the alimentary canal. First stage of nutrition in animals.

(a)(ii) Breaking down of complex food into simple, soluble and diffusible food. Second stage of animal nutrition. Physical digestion - breaks food into smaller pieces with teeth. Chemical digestion - hydrolysis of food by enzymes, results in simple soluble foods. Carbohydrates digested to glucose and sugars, proteins to amino acids, fats/lipids into fatty acids and glycerol.

(a)(iii) Third stage in animal nutrition. Takes place in ileum which has villi and microvilli to increase the surface area for absorption. Glucose and amino acids are absorbed into the blood via capillaries while fatty acids and glycerol are absorbed by the lymph in lacteals.

(b)(i) Stored in the liver and muscles as glycogen. Excess glucose is converted to glycogen with the aid of insulin. Glycogen is insoluble and does not affect osmotic potential/concentration of cells. Glycogen can be converted back to glucose when need arises.

(b)(ii) Stored under the skin, around internal organs, in the liver. Insoluble hence does not affect concentration of cells - convenient storage substance. Subcutaneous fat under skin provides insulation to prevent heat loss. Fat can be oxidised to provide energy.

6.

Increasing light intensity increases rate of photosynthesis up to a certain limit. At this point of light saturation, other factors such as concentration of carbon dioxide become limiting factors. At low light intensities, only some shade plants can carry out photosynthesis. Rate of photosynthesis varies during the day, it is highest between 12pm and 2pm when sunlight is brightest.