# MARKING SCHEME

**BIOLOGY**
**PAPER 1**
**FORM 3**

**EXAMINATION**
**Time: 2 HOURS**

**Instructions to Candidates; ANSWER ALL THE QUESTIONS IN THE SPACES PROVIDED.**

1.A solution of sugarcane was boiled with hydrochloric acid then cooled. Sodium carbonate was added then Benedict's solution. The solution was boiled and an orange precipitate was formed.

(a) Why was the solution boiled with hydrochloric acid? (1mark)

**To hydrolyze/break down non-reducing sugars to reducing sugars;**

(b) To which class of carbohydrates does sugarcane belong? (1mark)

**Disaccharide**

(c) Name the type of reaction that takes place when:

(i) Simple sugars combine to form complex sugars (1mark)

**Condensation**

(ii) A complex sugar is broken down into simple sugars (1mark)

**Hydrolysis**

2. Describe photolysis(2marks)

**Chlorophyll absorbs light energy; which breaks down water into oxygen and hydrogen atoms; some of the light energy is converted to ATP**

2. Name **two** instruments used in the laboratory for magnification. (2marks)

**Microscope;**

**Hand lens/magnifying lens;**

3. Give reasons why microscopic sections require to be: (2marks)

(a) Very thin; To **allow light to pass through;**

(b) Kept wet during processing; **To keep the cells turgid/ Prevent them from drying**

4. State **two** sites for gaseous exchange in submerged aquatic plants (2marks)

**Aerenchyma;**

**Epidermis**

5. Explain why a person can catch a cold several times in a year but only catches measles once in his/her lifetime. (3marks)

**Antibodies formed against common cold; viruses remain in the body for a while and thus provide immunity for only a few days;**

**Antibodies formed against the measles virus remain in the body for a life time and provide immunity throughout the person's life;**

6. (a) State two sites in animals where counter- current flow of fluid occurs(2marks)

**Kidney tubules;Gills of bony fish**

(b)Explain the significance of the counter -current flow of fluids(2marks)

**To maintain a steep concentration gradient for efficient exchange of materials.**

7. Students observed that the smell from a decomposing animal carcass was stronger at mid-day than early in the morning.

(a)Name the physiological process by which the smell reached the students(1mark

**Diffusion**

(b)Account for the observation made by the students(2marks)

**Temperature increases kinetic energy of molecules;thus increasing rate of diffusion**

8. State three characteristics of the kingdom Monera that are not found in the kingdom animalia(3marks)

**They are unicellular and microscopic**

**They are prokaryotic**

**They lack membrane bound organelles**

9. Account for the following observations

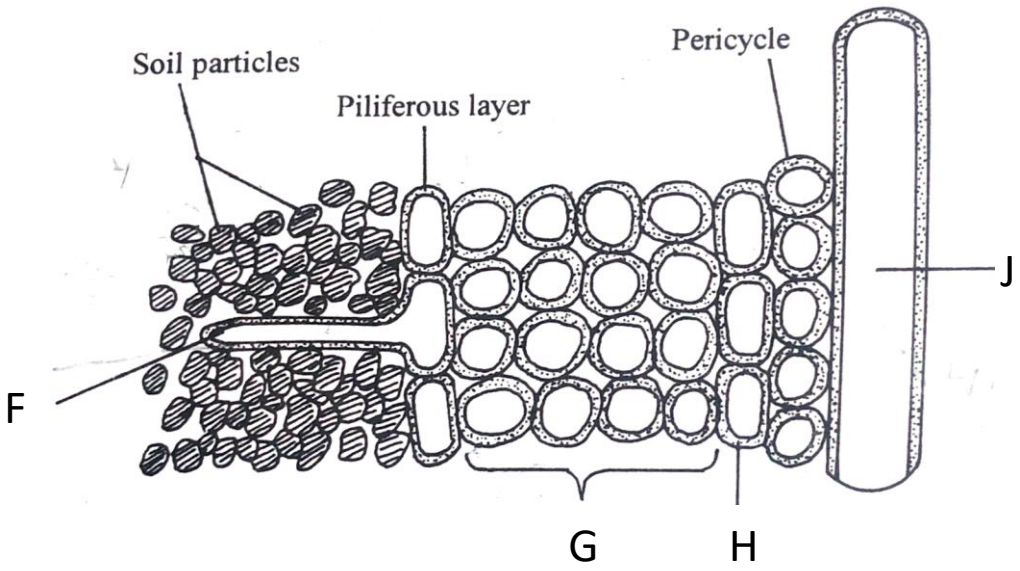
(a)When the pancreatic duct of a mammal is blocked, blood sugar regulation remains normal while digestion is impaired. (2marks)

**Pancreatic juice containing digestive enzymes is blocked, from reaching food through the pancreatic duct; insulin and glucagon which regulates sugar is released directly to the Bloodstream and reaches the liver where it regulates sugar in the body;**

(b)Most desert animals have long loop of Henle(2marks)

**To increase surface area for reabsorption of water; resulting in release of less urine thus enables the organism to conserve water**.

10. The diagram below shows part of a longitudinal section of a young root.




a) Name the structure **G** and **H**. (2 marks)

**G- cortex;**

**H-endodermis**

(c) Describe how water from the soil reaches structure **J**. (4marks)

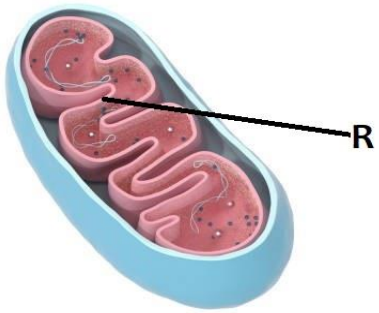
**Cell sap of the root hair cells is hypertonic to the soil solution; water molecules move from the soil into the root hair cells by osmosis; the cell sap of root hairs become diluted hence becomes less concentrated than the adjacent cortex cells; water moves into the cortex cells by osmosis; water moves from cells to cell by osmosis until it reaches the endodermis; where it is actively pumped into the xylem vessels/J;**

11.(a) Why are proteins said to be amphoteric? (1mark)

**They have both acidic and basic properties**

(b) Under which condition does the body resort to using protein as a respiratory substrate (1mark)**During prolonged starvation (when the carbohydrates and fat reserves are exhausted**

12. Use the diagram shown below to answer the question that follows




(a)Name the organelle shown above(1mark)

**Mitochondrion;**

(a) Name structure **R** and give its importance to the functioning of the organelle shown? (2marks)

**Name: Crista.**

**Importance: Increase surface area for attachment of more respiratory enzymes;**

13. Other than observing, name **one** other scientific skill developed by studying biology. (1mark)

**Analysing**

14. Name the branch of Biology that deals with the study of phylogenetic relationship among Organisms. (1mark)

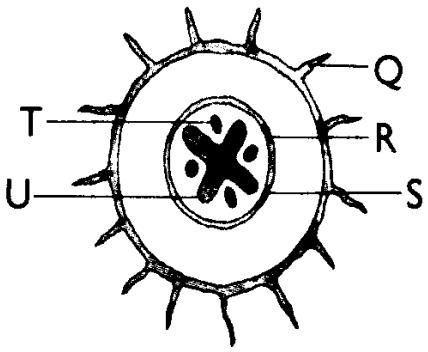
**Phylogeny**

15. State three structural adaptations of the red blood cell to its function. (3marks)

**-They lack nucleus to increase surface for packaging more hemoglobin;**

**-They lack Mitochondria to Prevent Oxygen utilization for efficient Oxygen transport**

16. The following is a transverse section from a young root



(a)(i) Name parts Q and U. (2marks)

**Q- root hair;**

**U- xylem**

(ii) With a reason, name the class of the plant from which the root was obtained (2marks)

**Dicotyledonae; star shaped xylem;**

(b) State the function of the part labelled Q (1mark)

**Absorption of water and mineral salts;**

17. A little starch solution was kept in a water bath at 37ºC. After a few minutes, the same volume of saliva was added. The experiment was left to stand for 15minutes. The mixture was then tested with Benedict's solution.

a) What would you do to the mixture after adding Benedict's solution in order to get the valid results? (1mark)

**Heat to boil/heat/place the mixture in a water bath;**

b) What final color would the solution change to? (1mark)

**Green/yellow/orange/brown;**

c) If you added iodine instead of Benedict's solution to the mixture of saliva and starch, what colour would the solution have? (1mark)

**Brown colour is retained**

18.A patient complained of frequent thirst. A sample of the patient's urine was found not to have any sugar.

(a)Name the hormone the person was deficient of. (1mark)

**Antidiuretic hormone/ Vasopressin**

(b)Name the gland that secretes the above hormone. (1mark)

**Pituitary gland;**

19. State the advantage of desert animals excreting their nitrogenous waste in form of urea and not ammonia. (1mark)

**Urea requires less water for elimination; hence assist desert animals to conserve body water;**

20. The equation below represents a physiological process that occur in plants.

$$6CO_2 + 6H_2O \longrightarrow C_6H_{12}O_6 + 6O_2$$

a) Name two conditions necessary for the process to occur(2marks)

**Light; Chlorophyll;**

b) Identify two adaptations of the leaf for the process indicated by the equation above. (2marks)

**Broad flat lamina to provide a large surface area for absorption of carbon IV oxide and sunlight;**

**The thinness of the leaf allows light and carbon IV oxide to pass through a short distance to reach the photosynthetic cells;**

**Presence of stomata ensures the efficient diffusion of carbon IV oxide to the leaf,**

**The cuticle and epidermis are transparent o allow penetration of light to the palisade cells;**

**The palisade cells contain numerous stomata and their arrangement and position next to the upper epidermis enables them to receive maximum sunlight;**

**The existence of extensive veins which conduct water and mineral salts to the photosynthetic cells and removes the products of photosynthesis;**

**The air spaces in the spongy mesophyll layer are large enough to allow gases to circulate easily;**

21. Identify two adaptations of a gaseous exchange surface (2marks)

- **Have a large surface area for efficient diffusing of gases;**
- **Moist to dissolve respiratory gases**
- **Have thin epithelium for faster diffusion of respiratory gases**
- **Highly vascularized to maintain a steep concentration gradient**

22. (a) Identify the function following parts of a microscope (2marks)

(i)Diaphragm; **An aperture that regulates the amount of light passing through the condenser to illuminate the specimen**

(ii)Condenser; **Concentrates light onto the stage**

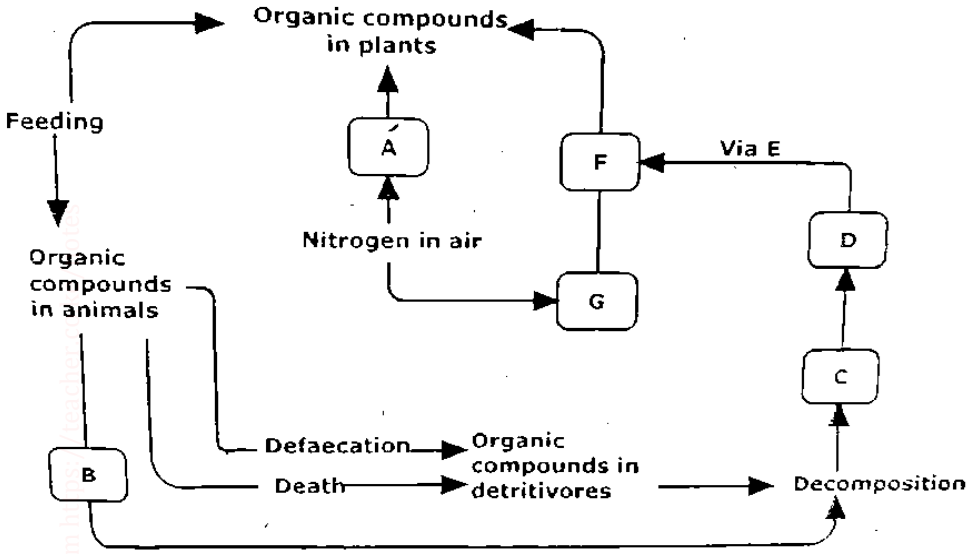
(b)Explain the term resolution as used in microscopy (1mark)

**The ability of a microscope to distinguish two very close structures as separate entities**

23. Name **two** supportive tissues in plants that are lignified (2marks)

**Sclerenchyma;xylem**

24. The diagram below represents nitrogen circulation in an ecosystem.




(a) Identify the following organisms (2marks)

**A- rhizobium ;( acc clostridium and azotobacter; acc plural) rej wrong sp;**

**B- Fungi; acc bacteria;**

s (b) Name process E(1mark)

**Nitrification;**

25. (a) Name the type of muscles found in the gut. (1mark)

**Smooth muscles**

(b) Give one difference between the muscles above and the one found in the heart (1mark)

| Smooth muscles | cardiac muscles |
|---|---|
| **not striated;** | **Striated;** |
| **Uninucleated;** | **Multinucleated;** |
| **Spindle shaped;** | **Cylindrical;** |

26. A process that occurs in plants is represented by the equation below.

$C_6H_{12}O_6 \longrightarrow 2C_2H_5OH + 2CO_2 + Energy$

(a) Name the process (1mark)

**Alcohol fermentation/anaerobic respiration**

(b) State the economic importance of this process. (1mark)

**Bread making/baking; manufacture of dairy products; production of biogas**

27. State any two rules of binomial nomenclature (2marks)

**Genus is written first followed by species; Genus starts with a capital letter; Genus and species are underlined separately when handwritten or italicized in printed work;**

28. (a) Name the causative agents of the following human diseases (2 marks)

(i) Bilharzia

***Schistosoma mansoni/Schistosoma japonicum/Schistosoma haematobium ;(Rules apply)***

(ii)Amoebic Dysentery

***Entamoeba hystolytica;***

(b) State two methods of controlling air pollution (2 marks)

**Use of lead free fuel/petrol; scrapped chimneys in factories; fossil fuels e.g biogas; biological methods of controlling pests and diseases**