

231/1

BIOLOGY

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Paper 1 Marking Scheme

1. State the meaning of the following terms as used in biology. (2 mark)

- (a) Embryology - *Study of the development of embryos;*
(b) Ornithology - *Study of birds;*

2. (a) Name **two** systems of classification of living things common to Biologists. (2 marks)

- *Natural classification;*
- *Artificial classification;*

(b) A banana plant was classified as *Musa parasidiaca* by a taxonomist. Identify the taxonomic units represented by the following words. (2 marks)

- Musa* - *Genus name;*
parasidiaca - *Species name;*

3. (a) The cell is the basic structural and functional unit of a cell. State three properties of cell membrane in a living cell. (3 marks)

- *Semi permeable or selectively permeable;*
- *Has electric charges / polarised;*
- *Sensitive to change in temperature and pH;*
- *Three layered for strength, or made of protein and phospholipid layer;*

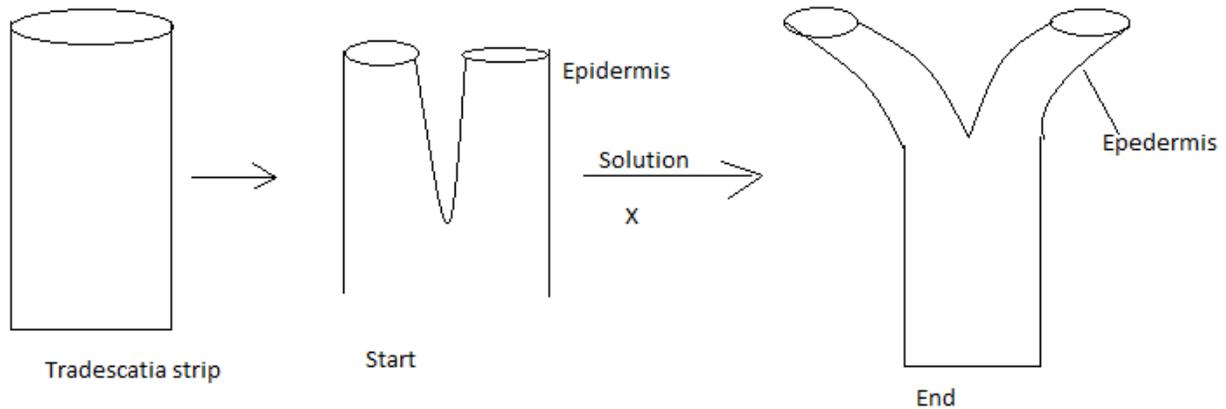
(b) State **two** major functions of centriole in animal cells. (2 marks)

- *Formation of flagella and cilia;*
- *Cell division / formation of spindle fibre for cell division;*

(c) Name two types of vacuoles in an amoeba cell. (2 marks)

- Contractile vacuole;*
-*Food vacuole;*

4. A strip of a herbaceous *Tradescantia* was cut longitudinally as shown below and placed in solution X. After one hour, the strips appeared as shown below.



(a) What was the nature of solution X? (1 mark)
-Hypotonic;

(b) What physiological process was being investigated? (1 mark)
-Osmosis;

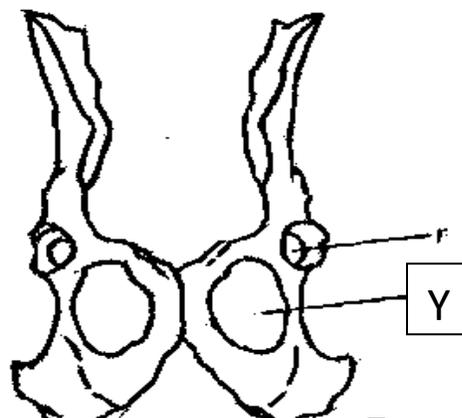
(c) Account for the results at the end of experiment after one hour. (3 marks)

-The parenchyma cell on the cut surface absorbed water by osmosis; the cells expanded/swell; the epidermal cells have cuticle and did not absorb water hence the bending was outward;

5. State **two** raw materials required to produce energy in cells for the process of active transport. (2 marks)

- *Oxygen;*
- *Food substrate/glucose/fatty acid/glycerol/amino acid;*

6. The pelvic girdle of a mammal is shown below. Study it and answer the questions that follow.



(a) (i) Name the part labelled Y.

Name : *Obturator foramen*;

(1 mark)

(ii) State the three functions of part Y named in (a) (i) above.

- Functions: *Allows for the passage of nerves;*
- *Allows for the passage of blood vessels;*
- *Allows for the passage of muscles.;*

(3 marks)

7. (a) Name **two** elements required by plants for the synthesis of chlorophyll pigment.

(2 marks)

- *Nitrogen;*
- *Magnesium;*

(b) What name is given to plants whose leaves turn yellow due to lack sunlight and the two elements above?

(1 mark)

-Chlorosis ;

8. Name **two** types of curves obtained during measurement of growth in living things.

(2 marks)

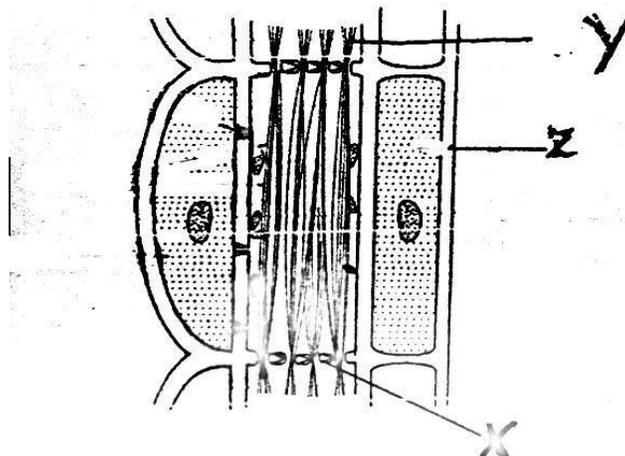
- *Sigmoid curve*
- *Intermittent curve*
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9. State three adaptations of xylem vessels to transportation of water.

(3 marks)

- *Narrow lumen for increased capillarity;*
- *Made up of dead cells so as not to use water being transported;*
- *Hollow to allow free flow of water;*
- *Lignified and strengthened to prevent collapse during transportation;*

10. The structure below is the phloem tissue.



(a) Name the two main components of the tissue. (2 marks)

- Sieve tube element;
- Companion cell;

(b) Name the part labelled **Y** and state its function. (2 marks)

Y - *Cytoplasmic filament;*

Function: *Translocation of food through cytoplasmic streaming;*

11. State and explain the role of Heparin in the blood. (2 marks)

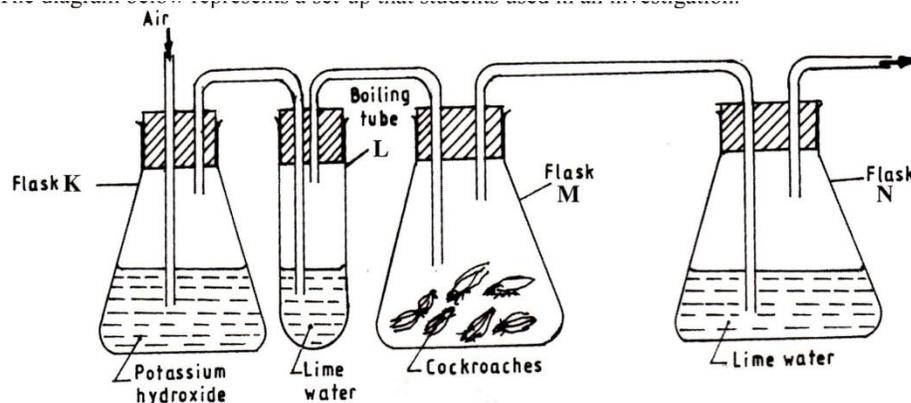
-Heparin is an anti-clotting substance; it prevents clotting of blood within the blood vessels;

12. State the adaptations of a respiratory surface in terrestrial animals. (3 marks)

- *Moist to dissolve gases;*
- *The walled / thin epithelium to reduce distance travelled by gases;*
- *Highly vascularised for transportation of gases;*
- *Large surface area to provide for efficient gaseous exchange;*

13. The diagram below illustrates gaseous exchange in animals.

The diagram below represents a set up used to study gaseous exchange in animals.



(i) Why was air passed through potassium hydroxide in **flask K**? (1 mark)

- *To remove any solid / dust / purify air;*
- *To dissolve carbon (IV) oxide in air;*

(ii) Explain the observations made in **Flask N**. (2 marks)

-Calcium hydroxide change to a white precipitate; carbon (IV) oxide produced by the cockroaches reacted with calcium hydroxide to produce a white precipitate;

(iii) Why is there no oxygen gas in the air exiting flask N? (2 marks)

-All oxygen was used up by the cockroaches at flask M, for respiration; producing carbon (IV) oxide as a metabolic waste product;

14. (a) Name **three** gaseous exchange surfaces in plants. (3 marks)

- *Stomata;*
- *Lenticels;*
- *Pneumatophores;*

(b) Name the gas released by plants to the atmosphere at night? (1 mark)

- *Carbon (IV) oxide;*

(c) What is the effect of dust on gaseous exchange in terrestrial plants? (1 mark)

- *Block the stomata and lenticels stopping gaseous exchange;*

15. Name the major physiological process of respiration that take place;

(a) At the cytoplasm of the mitochondrion. (1 mark)

- *Glycolysis;*

(b) At the matrix of the mitochondrion. (1 mark)

- *Kreb's cycle;*

16. (a) State **two** significance of R.Q values to a biologist. (2 marks)

- *Gives the type of respiration;*
- *Gives the type of substrate being respired;*

(b) The equation below is a respiratory reaction of a certain substrate. Study it and use it to determine its R.Q value. (2 marks)



$$\begin{aligned} R.Q &= \frac{\text{Volume of carbon (IV) oxide produced;}}{\text{Volume of oxygen used}} \\ &= \frac{20}{20} \\ &= 1.0; \end{aligned}$$

17. (a) State **two** types of variations in the study of genetics. (2 marks)

- *Continuous;*
- *Discontinuous;*

(b) Which of the two types of variations mentioned above is influenced by the genotype of an individual only? (1 mark)

- *Discontinuous;*

(c) What is a gene locus in genetics? (1 mark)

- *The position /location occupied by a gene in DNA strand;*

18. (a) Explain the biological reasons behind large volume of urine produced by fresh water Tilapia in Lake Victoria. (2 marks)

- *Many glomeruli to increase ultrafiltration for formation of large volume of urine;*
- *Short and few nephrons to reduce reabsorption of water back into the blood stream increasing the volume of urine;*
- *Fresh water fish release ammonia which requires a lot of water from its elimination increasing the volume of urine;*

(b) Why do insects and birds produce uric acid and not urea as in man? (2 marks)

- *Uric acid is the least toxic nitrogenous waste;*
- *It requires the least amount of water for dilution and elimination;*

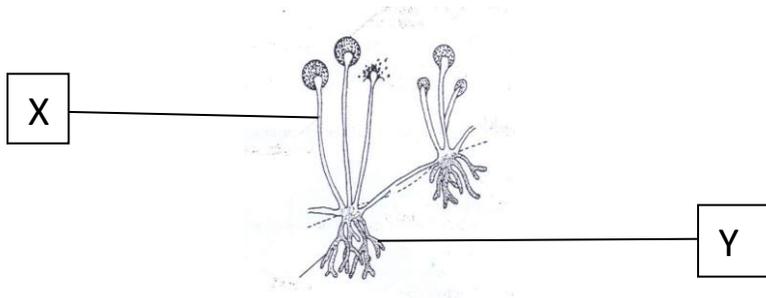
19. Name **two** types of diabetes that afflict man. (2 marks)

- *Diabetes mellitus*
- *Diabetes insipidous*

20. State using root structures only how you can identify and group a plant as either a dicotyledonae or monocotyledonae using both morphological and anatomical structures. (2 marks)

- *Dicotyledonae have a tap root system whereas monocotyledonae have a fibrous root system;*
- *The root in dicotyledonae cross section has a star shaped xylem but xylem is scattered in monocotyledonae;*

21. The organism below is found in kingdom Fungi.



(a) Using structures X and Y only, why does the organism not qualify as a plant? (2 marks)

X – Lacks photosynthetic pigments/Non green in colour;

Y – Poorly developed thread-like structures used for absorption only/root-like Structure;

(b) What division does the moss and liverwort belong to in kingdom plantae? (1 mark)

- *Division Bryophyta;*

22. Name **two** branches of Ecology. (2 marks)

- *Autecology;*
- *Synecology;*

23. What is a receptor? (1 mark)

- *A structure in the body of an animal capable of detecting or responding to a stimulus;*

24. State **two** adaptations of each of the following structures to reproduction in animals.

(a) Oviduct (2 marks)

- *Lined with cilia for moving egg cell /ovum to the uterus;*
- *Lined with smooth muscles that contract to push ovum forward;*

(b) Epididymis (2 marks)

- *Highly coiled tubular structure for temporary storage of sperms;*
- *Long to provide room for storage of sperm cells;*

25. State the functions of each of the following cells in the testes. (2 marks)

(a) Sertoli cells

- *Nourish and support the spermatozoa;*

(b) Interstitial cells

- *Produce androgens /male hormones testosterone;*

26. Name **two** bacterial diseases that are sexually transmitted as infections. (2 marks)

- *Gonorrhoea;*
- *Syphilis;*

27. Name the chemical substances in plants that; (3 marks)

(a) Promote ripening of fruits *Ethylene;*

(b) Flowering in plants *Florigen;*

(c) Leaf fall in plants *Abscissic acid;*