

BIOLOGY PAPER 1

FORM FOUR

MARKING SCHEME

1. Distinguish between anatomy and morphology. (2mks)

Anatomy	Morphology
Study of internal structures of an organism	Study of external structure;

2. State the characteristics of living things that is being demonstrated by seeds producing heat during germination (1mk)

Respiration

3. a) During a field study. A form one student at kabai School observed the organism below. Name one appropriate tool the student would use to collect the specimen. Give a reason for your answer. (2mks)

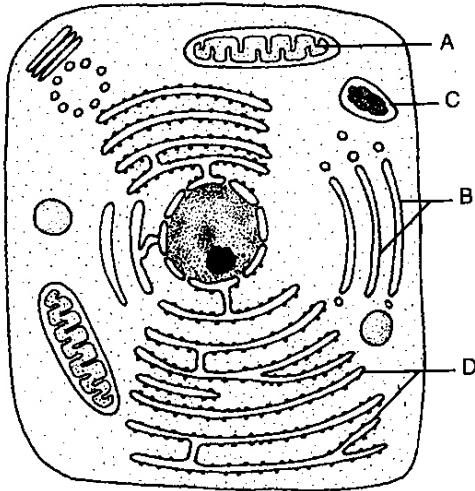


Pair of forceps; has stinging structures; acc pitfall trap;

- b) State three precautions the students should take during the collection of the above specimen. (3mks)

- should not harm the specimen;
- should not destroy the natural habitat of the specimen;
- should return it back to its habitat after they are through with the study if still alive;
- should use a protective gear/pair of forceps to avoid being stung;

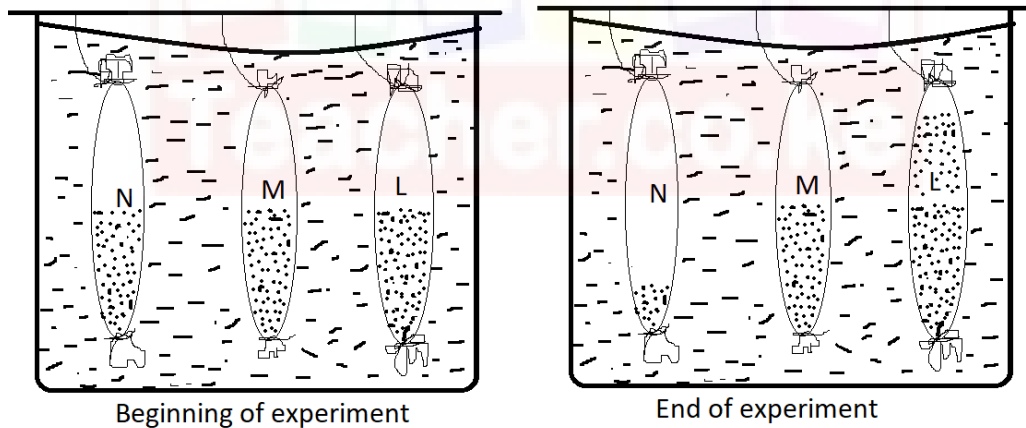
4. The diagram below represents a cell as seen under an electron microscope.



- a) Identify the parts labeled A and D. (2mks)
- A - Mitochondrion; rej plural
 - D - Rough endoplasmic reticulum; rej singular

- b) State the function of the structures found on the part labeled D. (1mk)
- Site for protein synthesis;

5. Equal amounts of three different sugar solutions were placed in the visking tubings M, N and L. the tubings were placed in a beaker of water containing 5% sugar solution. The set up was left for two hours. The results were as shown in the diagram below



- (a) Which process was being investigated. (1mk)
- Osmosis;
- (b) State the nature of solution M and L as compared to the 5% sugar solution in the beaker. (2mks)

M – isotonic;
L – hypertonic;

- (c) Account for the results obtained in visking tubing N. (3mks)
- N – sugar solution in visking tubing N was hypotonic to sugar solution in the beaker; hence water moved from the visking tubing into the solution; by osmosis;

6. a) Name one process that brings about
- The translocation of manufactured food in plants. (1mk)
 - Transport of water from the epidermal cells of the root to the cells at the center of a monocotyledonous root. (1mk)

Osmosis/ Root Pressure/ Active transport;

- iii. Absorption of soluble products of digestion from the alimentary canal into the blood stream. (1mk)

Diffusion/active transport;

7. The following is the dental formula of a certain mammal.

$$i \frac{0}{3} \quad c \frac{0}{1} \quad pm \frac{3}{3} \quad m \frac{3}{3}$$

- (a) (i) State the likely mode of feeding for the mammal. (1mk)

Herbivorous; rej herbivore

- (ii) Give a reason for your answer in (a)(i) above. (1mk)

Lack incisors/canines on upper jaw/Has horny pad in place of incisors and canines on upper jaw; (to provide a hard biting surface where lower incisors press to cut vegetation)

- (b) Explain how the carnassial teeth of a carnivore are adapted to their function. (2mks)

- Larger for cracking/crushing bones;
- Slide past each other/have scissor-like action for shearing /slicing off flesh/tendons/skin from bones;

8. A patient with blood group A was involved in a road accident and required urgent blood transfusion. His relatives were invited to donate blood.

- (a) Name the compatible blood groups. (2mks)

O; A;

- (b) State why other blood groups were not compatible (1mk)

Both AB and B –have antigen B which will react with antibody b in recipient blood causing agglutination;

9. Most carbon (IV) oxide is transported from tissues to the lungs within the red blood cells and not in the blood plasma. Give two advantages of this mode of transport. (2mks)

pH of blood plasma is not altered/homeostasis is maintained; within the red blood cells, there is enzymes (carbonic anhydrase) which help in fast loading/combination and offloading/dissociation of carbon (IV) oxide;

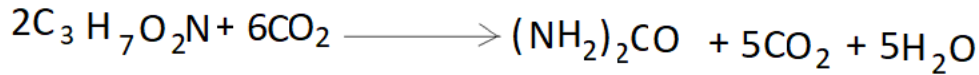
10. Name three forces involved in transportation of water and mineral salts up the stem (3mks)

Root pressure; cohesion adhesion forces; transpiration pull; capillarity

11. State three differences between anaerobic and aerobic respiration (3mks)

Anaerobic	Aerobic
Oxygen not required	Oxygen required;
Water not produced	Water is produced;
Less energy produced	A lot of energy produced;
Occurs in cytoplasm only;	Occurs in cytoplasm and mitochondria;

12. The oxidation state of a certain food is represented below by a chemical equation.



(a) Calculate the respiratory quotients [RQ] of the food substance. (2mks)

$$RQ = \frac{\text{volume of carbon (IV) oxide produced}}{\text{Volume of oxygen consumed}}$$

$$5/6 = 0.83;$$

(b) Identify the food substrate (1mk)

Proteins

13. State the function of the following in mammalian trachea. (3mks)

a) Rings of cartilage

Keep the trachea open;

b) Mucus

Trap dust/foreign particles;

c) Cilia.

Beat in waves to move mucus and trapped particles towards the pharynx away from the lungs;

14. a) Name the fluid that is produced by sebaceous glands. (1mk)

Sebum;

(b) What are the roles of sweat on the human skin? (2mks)

Kills micro-organisms; cools the body; getting rid of wastes/excretion;

15. In an investigation, equal amounts of water was placed in three test tubes labelled J, K, and L. Pond weeds of equal length were dropped in each test tube. The test tubes were then placed in identical conditions of light and carbon (IV) oxide at different temperatures for five minutes. After five minutes, the bubbles produced in each test tube were counted for a minute. The results were as shown in the table below.

Test tube	Temperature(°c)	Number of bubbles.
J	20	28
K	35	42
L	55	10

(a) Name one requirement for this process that is not mentioned in the investigation. (1mk)

Presence of chlorophyll;

(b) Name the gas responsible for the bubbles produced. (1mk)

Oxygen gas;

(c) Account for the results in test tubes K and L (2mks)

K- 35°c is optimum temperature for maximum enzyme activity/rate of photosynthesis at its highest ; (hence more oxygen/bubbles)

L-55°c denatures (photosynthetic) enzymes hence rate of photosynthesis is low(producing less o₂/bubbles);

16. (a) A student collected an organism and observed the following features: Simple eyes, four pairs of legs and two body parts.

(i) State the class to which the organism belongs. (1mk)

Arachnida;

(ii) Give an example of an organism in this class. (1mk)

Spider, tick, mite/scorpion.

(b) Name the kingdom to which plasmodium belongs. (1mk)

Protoctista;

17. What happens to excess fatty acids and glycerol in the body. (1mk)

Converted in to (neutral) fats and stored beneath the skin/adipose tissue;

18. Name two tissues in plants which are thickened with lignin. (2mks)
sclerenchyma; xylem vessels/xylem and tracheids;

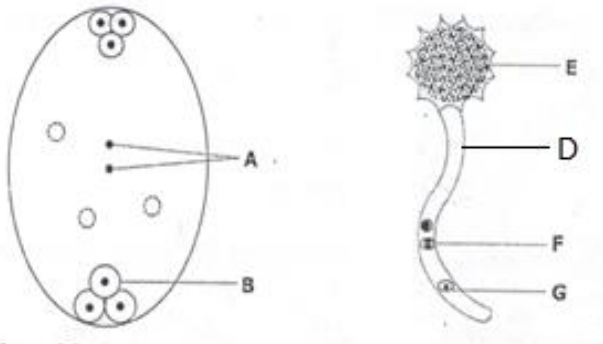
19. Name the part of a flower that develops into:
 (i) Seed (1mk)

Ovule

(ii) Fruit (1mk)

Ovary

20. The diagrams below show changes in the life cycle of flowering plants.



Complete the table below by choosing the letters from the diagram which refers to each of the given structure. (4) marks

STRUCTURE	LETTER
Pollen tube	<u>D</u>
Tube nucleus	<u>G</u>
Egg cell	<u>B</u>
Male gamete nucleus	<u>F</u>

21. Name the causative agent of the following diseases. (2mks)
 (a) Trichomoniasis.

Trichomonas vaginalis;

(b) Amoebic dysentery

Entamoeba histolytica; (observe binomial nomenclature)

22. (a) What is the relationship between leguminous plants and bacteria found in their roots. (1mk)
symbiosis/mutualism;

(b) Give two reasons why primary productivity in an aquatic ecosystem decreases with depth.

(2mks)

Light intensity decreases with depth, limiting photosynthesis; - Temperature decreases with depth, this lowers rate of photosynthesis;

23. State one survival value for each of the following in plants.

(a) Thigmotropism in stems. (1mk)

Provides support to non-woody/herbaceous stems; Enable plants to grow towards light while obtaining support;(1st one)

(b) Geotropism in roots. (1mk)

Enables plants to search for nutrients /water;

For anchorage/firm support to the ground; (1st one)

24. a) Give two sex linked genes found on the Y-chromosome. (2mks)

- Tuft of hair on nose and ear;
- Premature baldness
- Rej porcupine man

b) Below is a nucleotide strand

A	A	G	T	C
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i) Identify the type of nucleic acid. (1mk)

DNA/Deoxyribonucleic acid

iii) Give a reason for your answer in (a) above. (1mk)

Presence of thymine base;

25. (a) What are vestigial structures. (1mk)

Structures which have lost their function/ have ceased to be functional over a long period of time hence become reduced in size/rudimentary;

(b)Name a vestigial structure in human beings. (1mk)

- appendix
- coccyx/tail bone
- Nictitating membrane
- caecum
- Ear muscles

26. (a) Name the evidence of organic evolution exhibited by occurrence of similar amino acid molecules in a range of organisms. (1mk)

Comparative serology/cell biology;

(b)Why are some bacteria able to resist the effect of antibiotics. (2mks)

They have gene for resistance which is acquired through mutation/when bacteria are exposed to antibiotics for some time, they become used/adapted to living in its presence; The gene is passed to the offspring thereby establishing a population of antibiotics resistant bacteria;

27. (a) Name the type of skeleton that makes up each of the following animals

(i) Locust – Exoskeleton; (1mk)

(ii) Bird- Endoskeleton; (1mk)

(b)Name the fin(s) in tilapia fish responsible for the following: (2mks)

(i) Steering

Pectoral fin; caudal/tail fin;acc paired fins;

(ii) Pitching

Paired fins/pectoral and pelvic fins; (both mentioned)