



231/1

MARKING SCHEME

THE KENYA NATIONAL EXAMINATIONS COUNCIL
Kenya Certificate of Secondary Education

231/1



BIOLOGY (Theory) Nov. 2025 – 2 hours

Paper 1

Candidate's signature: _____ Date: _____

Instructions to candidates

- (a) Confirm that this question paper has your name and the correct index number.
- (b) Sign and write the date of examination in the spaces provided above.
- (c) Answer **all** the questions in this question paper.
- (d) All answers must be written in the spaces provided in the question paper.
- (e) **This paper consists of 12 printed pages.**
- (f) **Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.**
- (g) **Candidates should answer the questions in English.**

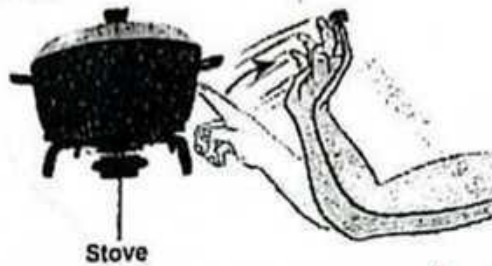
For Examiner's Use Only

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
17	18	19	20	21	22	Grand Total									



Answer all the questions in the spaces provided.

1. (a) State the characteristic of living organisms illustrated in the following diagram. (1 mark)



Irritability/response (to stimulus/stimuli) living organisms respond to stimulus/stimuli/heat/energy (in their environment). A.C.C. sensitivity
OWTTE

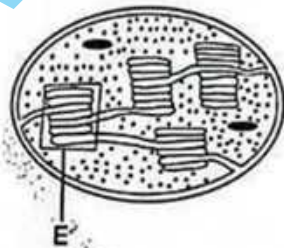
- (b) State the significance of the illustrated characteristic to living organisms. (1 mark)

(Enables) living organisms move away from unfavorable conditions (of temp./pressure/moisture); or converse.

2. Explain how relaxation of the diaphragm muscles leads to exhalation. (3 marks)

(Relaxing of the diaphragm muscles) cause diaphragm to assume a dome shape; reducing the vol of chest cavity; increasing pressure (hence expelling air out of the lungs/exhalation);

3. The following diagram illustrates an organelle obtained from a cell.



- (a) Identify the organelle.

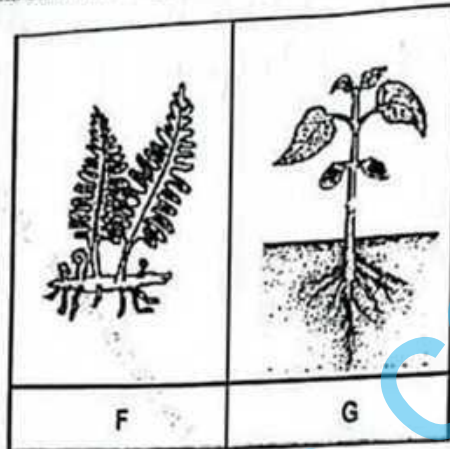
Chloroplast; a.c. plural

(1 mark)

- (b) State two roles of the muscle named in (a)(ii).

Contract and relax to bring about movt. of food down the A.C./facilitate peristalsis; contract & relax to facilitate mixing of food in the stomach/churning;

6. The following diagrams show two organisms belonging to two different Divisions.



- (a) Name the Division to which each organism belongs.

F Apteridophyta (1 mark)

G Spermatophyta (1 mark)

- (b) Explain why organism G is considered more advanced than F. (2 marks)

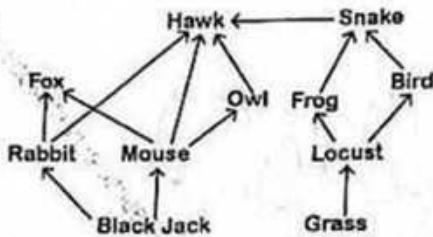
Organism G produces seeds/fruits/cones (which are more advanced reproductive structures than spores through which specimen F reproduces); specimen G has more advanced/developed transport / vascular (phloem and xylem) system (maximizing efficient water/nutrient movt. and/or growth and survival);

9. Explain why sugary foods are harmful to teeth. (3 marks)

acc (fermentation for fermentation) 6
 - Breakdown of food
 - production of acids
 - corrosion of teeth
 - formation of cavities

Bacteria (in the mouth) use sugar as (metabolic) substrates; the metabolic waste products are acidic; corrode tooth (enamel); forming cavities; acc formic/lactic/acetic acids; Max 3

10. Form 3 students constructed the following food web for organisms in a certain ecosystem.



From the food web:

(a) (i) identify the organism which is both a tertiary and a secondary consumer. (1 mark)

Hawk;

(ii) construct a food chain ending with the organism named in a(i) as a tertiary consumer. (2 marks)

Black jack → mouse → owl → Hawk;

(b) Name the mode of feeding exhibited by the snake. (1 mark)

Carnivorous; or Carnivore;

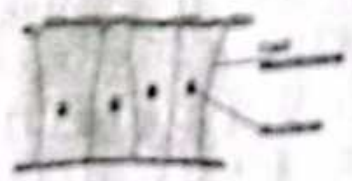
1. Complete the following table on respiratory diseases and their causative agents. (2 marks)

Disease	Causative agents
Tuberculosis	Mycobacterium tuberculosis
Whooping Cough	Bordetella pertussis

acc Mycoplasma tuberculosis

or wrong spelling

The following diagram illustrates cells found in a mammalian body.



(a) (i) Identify the type of cells illustrated. (1 mark)
Epithelial (Cells);

(ii) Name two parts of the mammalian body where the cells are found. (2 marks)
Breathing/respiratory tract; Fallopian tube/oviduct;

(b) State the function of the cells in any one of the parts named in (a)(ii). (2 marks)
In the context we can see cells are collected from parts like Fallopian tube/oviduct which serve the purpose of passing through the egg to the respiratory tract, which is the site of fertilisation. It is a part of a system of muscles/epithelial cells found in the Fallopian tube along the tract to help in egg transport.

The following diagram illustrates a stage of development of a human fetus.



(a) State the function of the placenta. (1 mark)
Protects the fetus against physical/mechanical shock/lubrication.

(b) There is the part labelled X assigned to its function. (2 marks)
the rich blood supply (artery/vein) to relay nutrients/exchange of waste material; it takes oxygen and nutrients; have some connective tissue to provide for exchange of materials (nutrients/waste) to/out of the fetus/mother.

Has veins; to relay nutrients/oxygen to fetus;
 Has artery; to transport wastes;
 Has rich blood supply; to relay nutrients/eliminate waste.

(1 mark)

(b) Name the part labelled E.

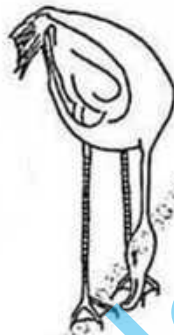
Granum, acc granum.

(2 marks)

(c) Explain how the part labelled E is adapted to its function.

Packaged/organized in stacks/highly folded; to increase S.A for packaging of (more) chlorophyll molecules (for absorption of more light/photosynthesis); Has (more) chlorophyll molecules; for trapping (more) light for photosynthesis.

4. The following diagram illustrates an organism belonging to a certain Class.



Thorax

(1 mark)

(a) Name the Class to which the organism belongs.

Aves; ~~rej wrong spellings~~

(1 mark)

(b) Suggest the likely habitat of the organism.

Aquatic/Water (envir) acc Examples of water bodies

(2 marks)

(c) State two reasons for your answer in (b).

Webbed feet/long legs for wading in water; (Curved) beak for filter feeding; Acc modification alone, ~~rej function alone, rej long legs alone acc webbed feet alone.~~

5. (a) Name the type of muscle found in the following parts of the body:

(1 mark)

(i) heart;

Cardiac (muscles);

(1 mark)

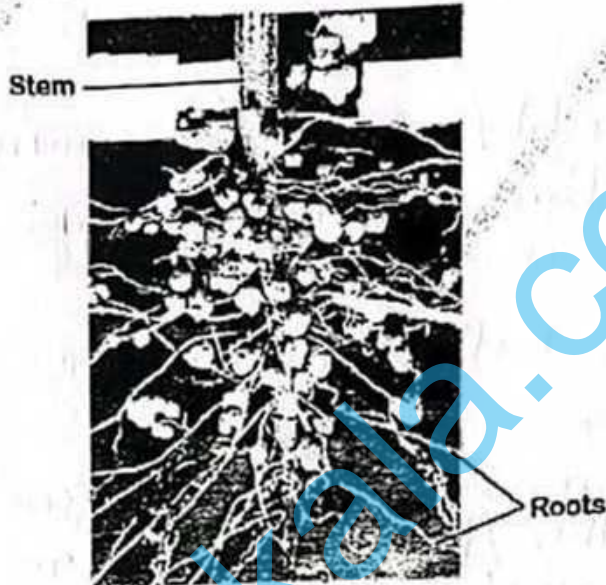
(ii) alimentary canal.

Smooth (muscles);

12. Complete the following table to show the differences between mitosis and meiosis. (2 marks)

	Mitosis	Meiosis
(i) Cells where it occurs	Somatic body/meristem somatic cells/tissues	Germs/gametes/ ovaries/anthers
(ii) Number of daughter cells produced	2	4

13. The following photograph shows a feeding relationship observed in a certain plant.



- (a) (i) Name the feeding relationship illustrated in the photograph. (1 mark)

Symbiosis

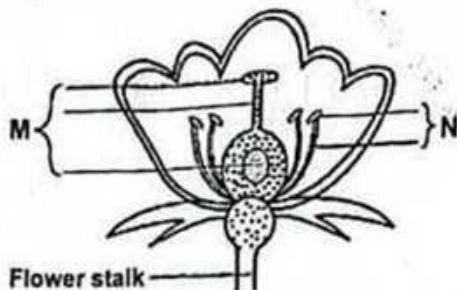
- (ii) Explain your answer in (a)(i). (2 marks)

Bacteria (in the root nodules) and (leguminous) plant benefit mutually from each other; the bacteria fix nitrogen which is used by the plant; the plant provides carbohydrates/shelter (to bacteria) a (ii) tied to a (i)

- (b) Give one example of a similar feeding relationship in animals. (1 mark)

Ruminant/mammalian stomachs and cellulose producing cellulose digesting bacteria/bees and flowers/oxpeckers and animals (cows/shinners/zebras)

14. The following diagram illustrates a flower obtained from a certain plant.



(a) State the collective name given to the floral parts labelled M and N.

M Pistil / Carpel / Gynoecium; (1 mark)

N Stamen / Androecium; (1 mark)

(b) (i) Suggest the likely mode of pollination for the flower. (1 mark)

acc: Plura
Insect pollinated; acc Cross pollination;

(ii) Give a reason for your answer in (b)(i). (1 mark)

Large / Conspicuous petals; stigma positioned above anthers / heterostyl; stigma located inside flower; acc. converse

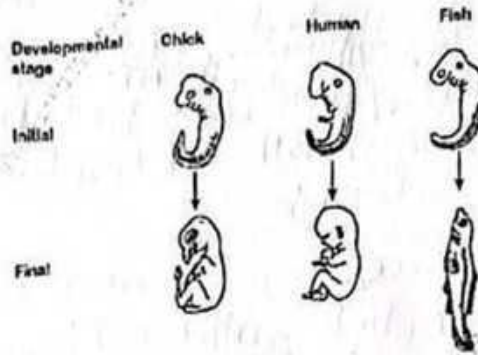
15. (a) Explain how low light intensity may bring about changes in the phenotype of some plants. (Low light intensity) results in low (3 marks)

Photo-synthetic rate / little amount of glucose / sugars manufactured; making stems stretch for light / elongate / bend towards; the stems / leaves may also be weaker / thinner / smaller leaves; (and coloured) yellow; (due to inadequate light) low light intensity may also lead to altered flowering time;

(b) Draw the diagrams to illustrate the difference between a dicotyledonous and a monocotyledonous leaf. (1 mark)

Dicotyledonous leaf	Monocotyledonous leaf

16. The following diagram illustrates embryos of chicken, humans and fish at different stages of development.



(a) Name the type of evidence of organic evolution illustrated. (1 mark)

Comparative embryology;

(b) Explain why the tail has been retained throughout the evolution of fish but not in humans and chicken. (2 marks)

Used for movement/propulsion/balancing; whereas in chicken and humans it has no function/it is a vestigial structure.

(c) State one other component likely to be common in the blood of the three organisms that implies they have a common origin. (1 mark)

Presence of (some) serum protein structures/plasma proteins (e.g. albumin/fibrinogen/globulin/prothrombin/antibodies) blood group antigens; similar haemoglobin structure/protein sequence; presence of similar cell organelles; 1st one marked

17. The following diagram illustrates an organism belonging to a certain Class.



(a) State how the parts labelled P, Q and R contribute to the success of the organism.

P (Antenna) detect/sense for danger (for survival)/mate (for propagation of genes) harmful/favourable environmental conditions (1 mark)

Q (Wings) for flying/movement (in search of food/mates/favourable conditions) (1 mark)

R (Abdomen) has spiracles for faster/efficient gaseous exchange (to facilitate respiration) (1 mark)

(abdomen) has segments for reproduction; (abdomen) contract and relax to enhance gaseous exchange

- (b) Account for the difference in the pattern of growth in a mouse and the organism illustrated. There is (smooth) continuous growth. (2 marks)

In the mouse while the illustrated organism/insect/arthropod there is intermittent growth pattern; occasioned by presence of hard exoskeleton. Continuous growth/growth takes place when the exoskeleton is shed;

18. (a) Explain how spilling of oil in a fish pond affects the flow of energy in the pond. (3 marks)

Covers water surface/clogs stomata; reducing uptake of CO_2 (for photosynthesis); reduces penetration of light for submerged plants affecting rate of photosynthesis/production of less oxygen (as a by product); resulting to reduce respiration/air circulation; less glucose/sugars/food are produced, less energy released for the primary consumer, and subsequent trophic level;

- (b) The following organisms were found in a certain ecosystem.

Tilapia
Insect larvae
Green algae
Eagle

Sketch a pyramid of numbers for the organisms in the ecosystem. (1 mark)



19. In an experiment, students placed soaked viable bean seeds in a vacuum flask containing wet cotton, then inserted a thermometer in the flask and left the set-up for 5 days in the laboratory.

- (a) State two processes that the students were investigating in the experiment. (2 marks)

Germination; respiration;

(b) State two observations that the students made after five days. (2 marks)

Increase in temperature; emergence of plumule/radicle; acc. germination.

20. (a) Name the antigen and antibody present in the blood plasma of an individual with blood group A⁺. (2 marks)

Antigen A/Rh/Rhesus factor; antibody b;

(b) Suggest the possible recipient of the individual's blood. (1 mark)

AB⁺/A⁺ acc. AB/A rej. AB/A⁻

21. (a) Name the physiological process that facilitates: (1 mark)

(i) uptake of water from the soil through the root hairs;

Osmosis;

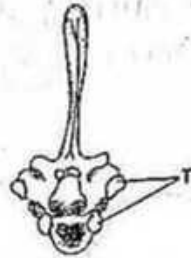
(ii) reabsorption of sodium ions from the kidney tubules. (1 mark)

Active transport;

(b) Explain why grass withers when it is continually sprayed with salty water. (3 marks)

The salty water is hypertonic to the cell sap in the grass; by osmosis; water molecules are drawn out of the grass/the grass lose water; grass cells become flaccid (and grass wither/dry up);

22. The following diagram illustrates a mammalian vertebra.



(a) Identify the type of vertebra illustrated. (1 mark)

Thoracic (vertebra);

(b) Name the bone that articulates with the vertebra at the parts labelled T. (1 mark)

Rib(s);

(c) Using observable features, explain how the vertebra is adapted to its function. (2 marks)

Has long ^{extended} neural spine / transverse process for muscle attachment; has neural canal / foramen for passage of blood vessels / neuron / spinal cord; Centrum / heart shaped to provide stability / support for thoracic cage; has facets / Centrum for articulation (with other bones);

12
82
254

322
7/2254
21
15
14
14

322
55
77
1610
1610
0

59
2
114
285

THIS IS THE LAST PRINTED PAGE.

Kenya Certificate of Secondary Education, 2025
231/1



tel: 523 4G

466
55
2430
2430
26730

Response
Response

466
7 2262
28
46