

KALA TRIAL EXAMINATION-2026

Kenya Certificate of Secondary Education

231/1

- BIOLOGY -

Paper 1

JULY 2026 2hrs



Name: **Admission No:**

Class: **HOUSE:**

Date:

School: **Signature:**

1. Name the branch of biology that deals with

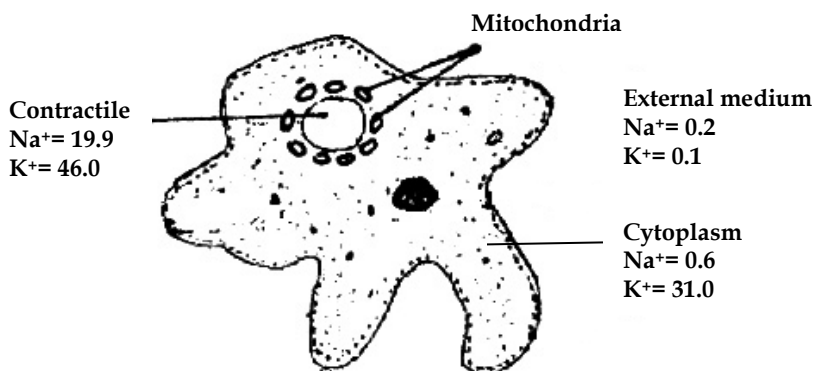
i) Study of development from egg to adult. (1mark)

Embryology

ii) Study of internal structure of living organisms. (1mark)

Anatomy

2. The diagram below represents a single celled organism. The concentration of Na^+ and K^+ are given in mmol^{-3} .



(a) Name the Kingdom in which the organism is classified **Protoctista** [1 mark]

(b) Other than cell organization give three differences between the kingdom above and kingdom Monera (3 marks]

Feature	Monera	Protoctista
Cell type	Prokaryotic (no true nucleus or membrane-bound organelles)	Eukaryotic (have a true nucleus and organelles)
Cell type	Has a cell wall	Lacks a cell wall
movement	Use flagella	Use pseudopodia

3. State the role of the following parts of the alimentary canal

i) Zymogen cells(chief cells) [1 mark]

Secrete pepsinogen, the inactive precursor of pepsin

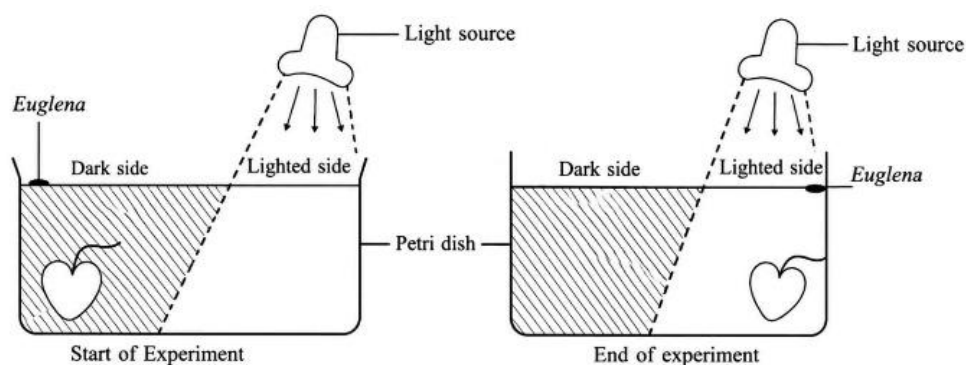
ii) Crypts of lieberkuhn [1 mark]

Secrete intestinal juice containing digestive enzymes and mucus

iii) Name the enzyme found in the caecum of herbivores. (1 mark)

Enzyme Cellulase

4. In an experiment to establish Euglena behaviour under different set of conditions experiment below was set up.



- a) What response was exhibited by the Euglena in the setup above? (1mark)

Positive phototaxis;

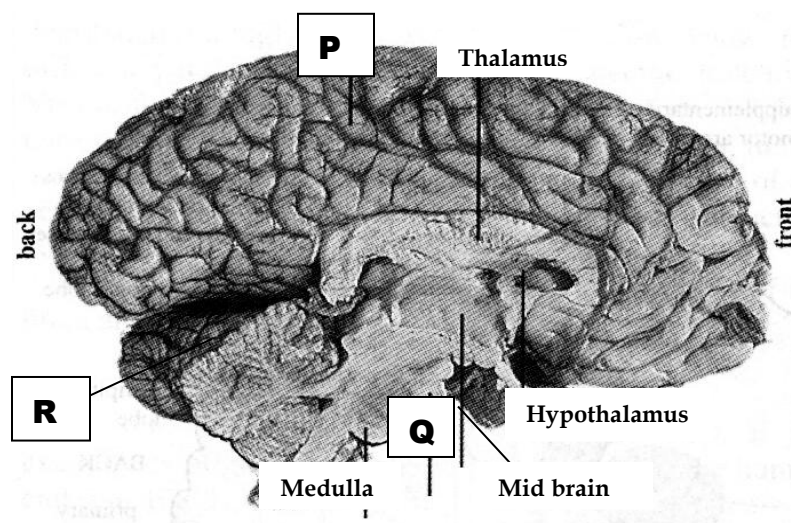
- b) What was the significance of the response you have named above to the euglena?(1 mark)

Enables the Euglena to obtain light for photosynthesis;

- c) A bean plant shoot will also respond to light. Give **two** differences between a bean plant shoot response to light and the response observed in Euglena above. (2marks)

Euglena	Bean
Response is temporary	Response is permanent
Response is faster	Response is slower
Response is locomotory	Response involves growth
Not influenced by growth hormones	Influenced by growth hormones

5. The diagram below shows a section of the human brain cut in half vertically through the middle.



- (a) **Identify** the parts labeled **P** and **Q**. [2 marks]

P cerebrum

Q cerebellum

- (b) **What** would happen if the part labeled **R** was damaged? [2 marks]

Disruption of vital functions such as breathing, heartbeat, and blood pressure regulation

6. The dark variety of peppered moth is predominantly found in industrial cities while the speckled white variety is predominantly found in rural areas in Europe.

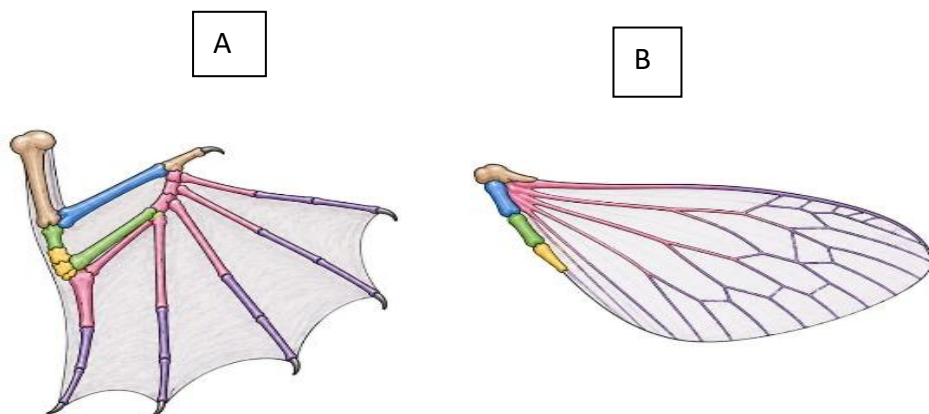
- a) Name the phenomenon illustrated above. (1mark)

Industrial melanism/polymorphism....natural selection

- b) What is the significance of the phenomenon above to the organism?(1mark)

Offers camouflage/reduces predation;

7. During a lesson a student observed the structures below to determine their evolutionary relationship.



a) i) Identify the type of evolution illustrated by the structures above. (1mark)

Convergent evolution

ii) What evidence of evolution illustrated. (1mark)

Comparative anatomy

iii) Name the type of skeleton found in organism with structure labeled B above. (1mark)

Exoskeleton

b) Name the hormone that has an effect on the skeleton from which the part of organism B was obtained at adult stage (1mark)

Ecdysone hormone

8. **Explain** the significance of the following changes during seed and fruit development

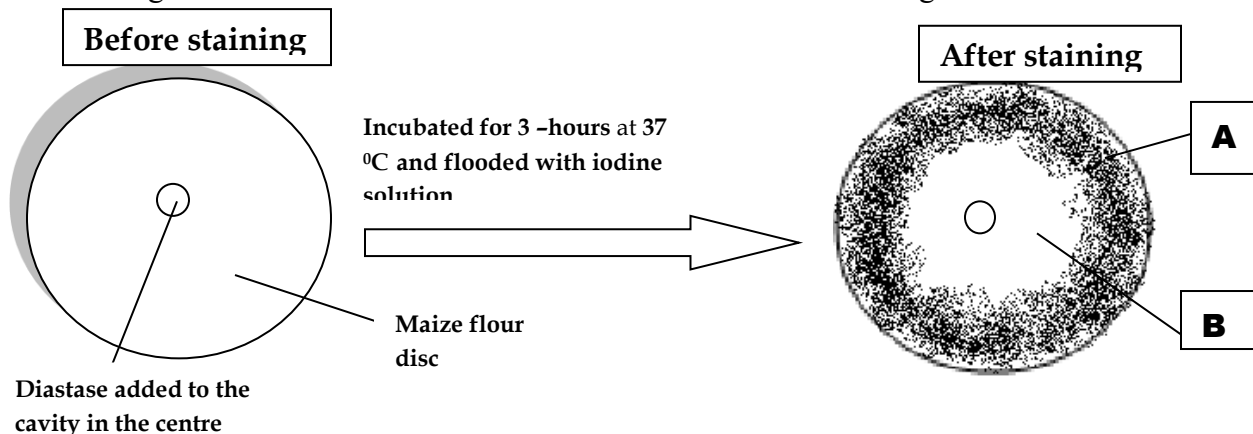
(i) Retention of a small pore in the testa. [1 mark]

The pore (micropyle) allows water and oxygen to enter the seed during germination.

(ii) Reduction in the water content of the seed from the normal levels of the plant tissues of about 90 % to about 10-15 % by mass. [1 mark]

It induces dormancy and reduces metabolic activity, allowing the seed to survive adverse conditions and remain viable for a long period.

9. The figure below shows a maize flour disc before and after staining with iodine solution.



- a) **Account** for the appearance of part **B** after staining with iodine. [2 marks]

Part B remains brown/yellow because starch in that region was digested by the diastase enzyme into maltose. Since iodine only turns blue-black in the presence of starch, no blue-black colour develops in part B.

- b) Name the physiological process illustrated above. (1mark)

diffusion

10. In humans presences of a dimple in the chin is controlled by a dominant gene. The first child of a couple, each with a dimple does not have a dimple but the second child does have a dimple.

- (a) Use alleles **D** and **d** to **show** the genotypes corresponding to the phenotype of the parents and the child without a dimple.

- (i) Genotypes of the parents

[1 marks]

Dd Dd

- (ii) Genotype of the child without a dimple and calculate the percentage .

[2 marks]

Dd ; 25%

- (b) Aside from the trait mentioned in (a) above **name** four types of discontinuous variations in man. (2marks)

Blood group

Ability to roll the tongue

Attached or free ear lobes

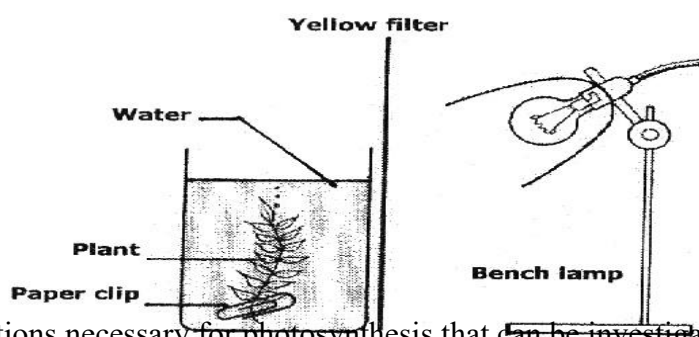
Sex (male or female)

11. State two functions of the pericardium. (2marks)

Secretes pericardial fluid that lubricates the heart when its working;

Keeps the heart in position and prevents over dilation of heart;

12. The set up below was used by a form 1 student to investigate an aspect of photosynthesis.



- (a) **Name** two conditions necessary for photosynthesis that can be investigated in this experiment. [1 mark]

Light

Chlorophyll (green pigment)

- (b) **State** two ways of increasing the rate of evolution of bubbles. [2 marks]

Move the lamp closer to the plant (increase light intensity).

Increase the concentration of carbon dioxide in the water (e.g., add sodium hydrogen carbonate).

13. What characteristics do gills of a fish and mouth cavity of a frog have in common that enable them to be efficient in gaseous exchange? (3marks)

Moist epithelium for dissolution of respiratory gases;

Highly vascularized to transport respiratory gases;

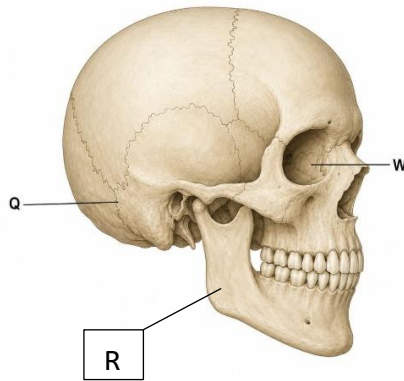
Thin epithelium for faster diffusion of respiratory gases;

14. Identify site of formation of red blood cells in. (2marks)

i) Adults - Bone marrow of short bones like ribs and vertebrae ;

ii) Embryo - liver ; spleen

15. The diagram below represent a mammalian skeleton, use it to answer the questions that follow.



i) Name the part labeled Q. (1mark)

sutures

ii) Give the role of the part W (1 mark)

Protects the eye

iii) Write down the dental formula for the organism above. (1mark)

i 2/2 c 1/1 pm 2/2 m 3/3

iv) Give the modification of structure R in herbivores. (2 marks)

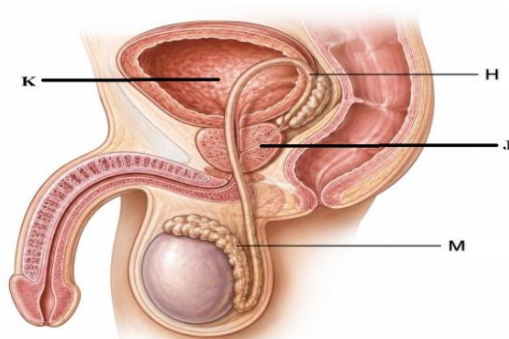
Has a diastema

The bone allows sideways movement to allow for grinding

Broad and flat molars and premolars for grinding

The enamel of the tooth are worn out and replaced

16. The diagram show part of the mammalian male reproductive system use it to answer the questions.



- i) Name the parts labeled K and H (2 marks)

K Urinary bladder

H Vas deferens

- ii) Give the role of the part labeled M (1 mark)

Long and coiled for temporary storage of sperms

- iii) Identify the part labeled J and give its role (2 marks)

Prostate gland ; secretion of an alkaline fluid that neutralizes the vaginal fluid

17. i) Name the organism that oxidize ammonia to nitrites . (1 mark)

Nitrosomonas and Nitrococcus

- ii) Give the difference between scavengers and detritivores in an ecosystem (2 marks)

- **Scavengers are carnivores that feed on dead bodies e.g. vultures, hyenas**
- **Detritivores are organisms that feed on dead plant material which is undergoing decomposition e.g. termites, cockroaches, earthworms e.t.c**

18. Define the following terms (1mark)

- a) Excretion -is the separation and removal/elimination of waste products of metabolism from the body cells during chemical reactions in the cell/ ***Separation and elimination of waste products of metabolism from bodies of living organisms;***

- b) Name the nitrogenous waste product excreted by

- Birds [1 mark]

Uric acid

- Marine bony fish [1 mark]

Trimethylamine oxide

c) What is Oxygen debt- (1 mark)

Amount of oxygen required to convert accumulated lactic acid to water, carbon(IV)oxide and energy;/ *Amount of oxygen required to get rid of lactic acid that accumulates in the body tissues when oxygen available is lower than the demand.*

19. State **any** structural modifications of the kidneys of deserts animals like kangaroo rat. (1mark)

- Extra long/longer loop of Henle to maximize water reabsorption back to the blood;
- Have fewer and smaller glomeruli to reduce ultrafiltration;

20. a) Why is seed dispersal important? (2 marks)

Reduce competition amongst seedlings for water, mineral salts and light;
Prevent overcrowding amongst plants;

(b) **What** is an

- Inflorescence? [1 mark]

Flowers that grow in clusters on the same flower stalk

- Epigynous ovary? [1 mark]

An ovary with floral parts above it

21. What part of the light microscope would be used to:

i) Regulate the amount of light reaching the stage. (1 mark)

Diaphragm;

ii) Change from one objective lens to another. (1 mark)

Revolving nose piece;

(b) Give a reason as to why specimen in electron microscope are dead. (1 mark)

They are observed in a vacuum; the complex dyes kills the specimen

22. (a) **Name the**

- (i) Process by which homologous chromosomes pair up during **prophase II**. [1 mark]

Synapsis

- (ii) Pair of homologous chromosomes formed in (a) (i) above. [1 mark]

Bivalent (tetrad)

(b) **Give** the difference between mitosis and meiosis during:

- (i) Metaphase [1 mark]

Mitosis: Individual chromosomes line up at the equator.

Meiosis I: Homologous chromosome pairs (bivalents) line up at the equator.

- (ii) Anaphase [1 mark]

Mitosis: Sister chromatids separate and move to opposite poles.

Meiosis I: Homologous chromosomes separate while sister chromatids remain attached

23. Explain how smoke and fumes cause

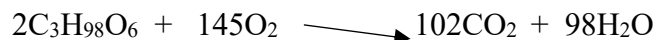
- i) Green house effect. (1 mark)

CO₂ prevents layers of warm air from escaping into the upper atmosphere causing greenhouse effect that leads to global warming

- ii) Respiratory poisoning (1 mark)

Carbon Dioxide causes respiratory poisoning since it readily combines with haemoglobin forming carboxyhaemoglobin leading to O₂ deficiency.

24. The oxidation of a certain food substrate is represented by a chemical equation shown below.



- a) Calculate the respiratory quotient of the food substance. (2marks)

$\frac{102}{145}$
=0.7

- b) Name the class of food substance being oxidized.(1mark)

Lipid

- c) Give two reasons why lipids are not the main respiratory substrates. (3marks)

They are not very soluble and therefore not easily transported to the sites of respiration.

It will also require more O₂ to oxidize one gram of fat than one gram of glucose

Complete oxidation of lipids takes a longer time

