

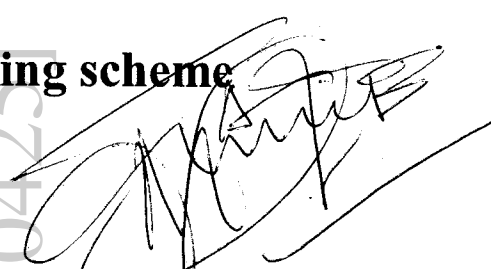
NAME:.....INDEX NO:.....

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231/1

BIOLOGY
PAPER I
(THEORY)
July/August 2018
TIME: 2 HOURS

Marking scheme



FORM 4 MID-YEAR EVALUATION EXAMINATION 2018 *Kenya Certificate of Secondary Education (K.C.S.E)*

Instructions to candidates

- (a) Write your name and Index number in the spaces provided.
- (b) Answer ALL questions in the spaces provided.
- (c) Candidates check the question paper to ascertain that all the papers are printed
- (d) This paper consists of 12 printed pages. Candidates should check the question paper to ensure that all pages are printed as indicated and that no questions are missing.

FOR EXAMINER'S USE ONLY.

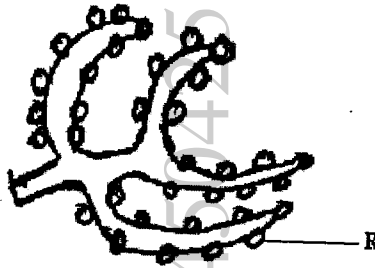
QUESTIONS	MAXIMUM SCORE	CANDIDATES SCORE
1 – 30	80	

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1. Name two components of blood that are absent in the tissue fluid (2mks)

-blood cells; ✓ acc. Correct examples *red blood cells/platelets*
-plasma proteins; ✓

2. The following is a drawing of a cell organelle



- i) Identify the cell organelle (1 mark)

-Rough endo[plasmic reticulum;

- ii) Give the function of the part labelled R. (1 mark)

-Site for protein synthesis;

3. (a) Name the association between leguminous plant and rhizobium bacteria (1mk)

Symbiosis; rej: wrong spellings

(b) A group of form three students were estimating the population of nut grass in their school field whose area is 480m^2 . They run two ropes of 2m long parallel to each other and placed them 1m apart. They counted and recorded the number of nut grasses enclosed by the two ropes. They repeated this three times. In the first set, they obtained 20 nut grasses, in the second set they obtained 11 star grasses and in the third set they obtained 8 star grasses.

- (b)(i) Identify the method of population estimation the students were using (1mk)

- Belt transect;

(ii) Using the above information, estimate the population of nut grasses in their field. Show your working.

(2mks)

Population = total area of area of study divide by area of single belt multiply by average number per belt. ;

$$480m^2/2m^2 *13= 3120 \text{ nut grasses};$$

4. State the function of the following apparatus

(a) a sweep net

(1mk)

For catching flying insects;

(b) a bait trap

(1mk).

For attracting and trapping small animals;

5. The diagram below shows a certain eye defect.



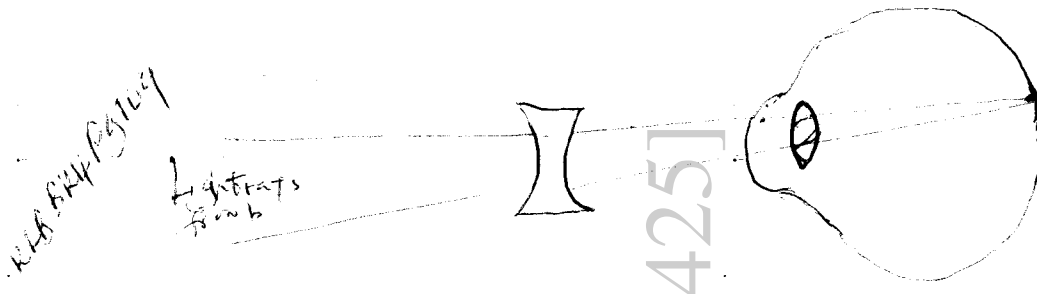
(a) State the defect.

(1mark)

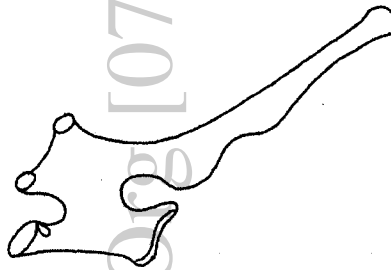
Short sightedness;

(b) On the space below, illustrate how the defect can be corrected.

(1 mks)



6. The diagram below represents the mammalian vertebra.



(a) Identify the vertebra represented above.

(1mk)

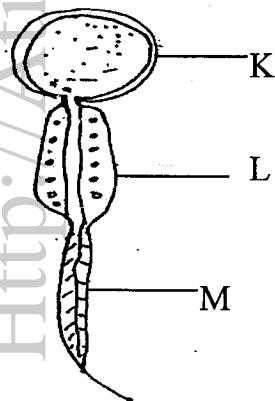
Thoracic vertebra; rej. vertebrae

(b) Give a reason for your answer.

(1mk)

Long neural spine; short transverse processes; presence of demifacets; (award one mark)

7. The diagram below represents one of the specialized cells found in the human body.



(a) Identify the cell (1mk)

Spermatozoan; *Acc. Sperm?*

(b) Name the parts labeled. K and L (2mks)

K - head; ✓

L...middle piece; ✓

(c) What is the function of part labeled M? (1mks)

Propels the sperm cell towards the egg by its lashing motion; *acc. propulsion for faster movement by swimming/ tail movement.*

8. State three theories that explain the mechanism of opening and closing of stomata.

(3 mks)

-photosynthetic theory; ✓

-starch-sugar interconversion theory/ pH theory; ✓

-Potassium ion theory; ✓

9. Explain how temperature and oxygen concentration affect the rate of active transport

Temperature
(2mks)

Rate of active transport increases with increase in temperature up to optimum temperature; Further increase in temperature slows down the rate of active transport until it stops because high temperatures beyond optimum denatures enzymes; *OWTTE*

Oxygen concentration

(2mks)

Oxygen is required in respiration to provide energy that drives active transport; increase in oxygen concentration increases the rate of active transport;

10. A student visiting a game park observed that an adult elephant flapping its ears twice as much as its calf in order to cool its body when it is hot. Explain

(2mks)

Calf has large surface area to volume ratio than the adult; hence calf ^{loses} ~~loses~~ ^{releases} more heat than the adult; acc. converse

11. State three importances of classification.

(3mks)

- Identifying similarities and differences between organisms*
For identification, for reference, for key study
- ii. Placing organisms into correct groups/ taxa, for key study;
 - iii. Arrange information about living organisms in orderly manner to ease study of organisms according to groups; to avoid chaos and confusion
 - iv. Help in understanding evolutionary relationships
 - vi. Help in monitoring disappearance and appearance of organisms | *present emergence*
 - vi. Help to in predicting characteristics of organisms

Award the first three

12. (a) Distinguish between the terms transpiration and Guttation

(2 mks)

Transpiration is the loss of water from plants in form of water vapour; while guttation is the loss of water from plants in form of water droplets *(through hydathodes)*

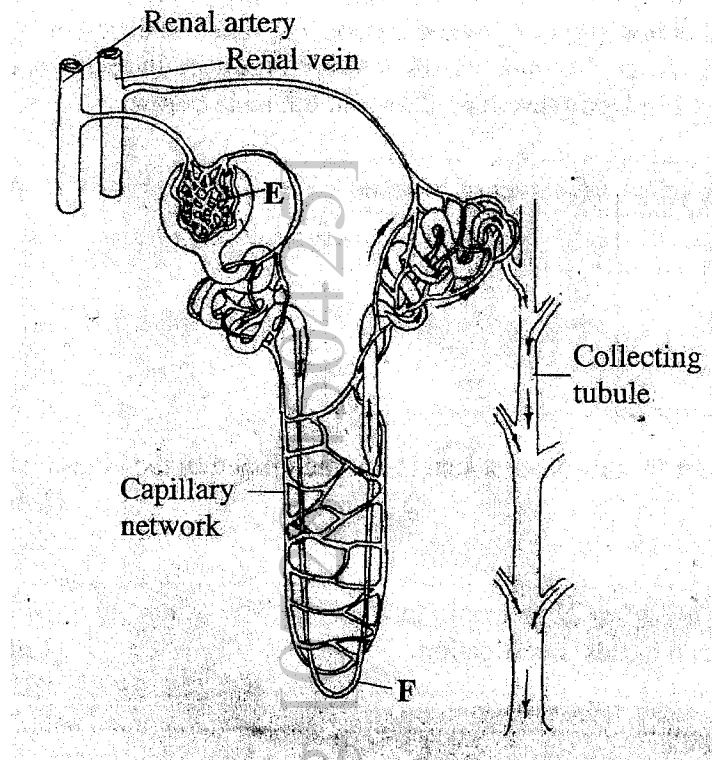
(b) State the structures through which each of the process named in (a) above occurs

(2mks)

Transpiration- stomata;

Guttation - hydathodes;

13. The diagram below illustrates the structure of the kidney nephron.



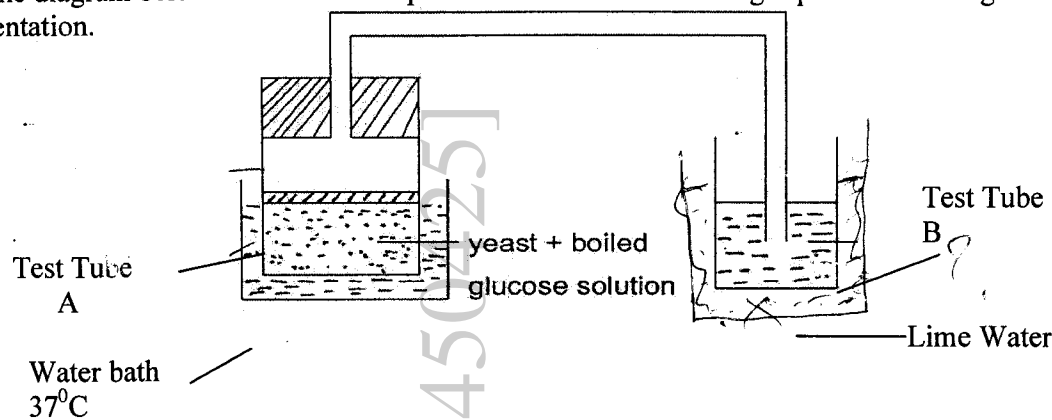
- (a) Name the part labelled E (1mk)

Glomerulus; (spellings must be correct and in singular form since its only one structure pointed)

- (b) How is the part labelled F adapted to its function? (3mks)

- ✓ *It is long, to increase the surface area for reabsorption of water;* ✓
- ✓ *It is lined with a network of capillaries, to enhance reabsorption of water;* ✓
- ✓ *It is U-shaped, to bring about a counter-current multiplier effect concentrating salts in the medulla to bring about reabsorption of water;* ✓

14. The diagram below illustrates an experiment to demonstrate the gas produced during fermentation.



After one hour the following observations were made:

- Gas bubbles appears in both tubes. ✓
- White precipitate formed in lime water. ✓

(a) Account for the above observations. ✓

(3mks)

Yeast cells respire anaerobically; breaking down glucose to Carbon (IV) oxide and ethanol. ✓

CO₂ reacts with lime water / Ca(OH)₂ to form Calcium hydrogencarbonate - all equ -

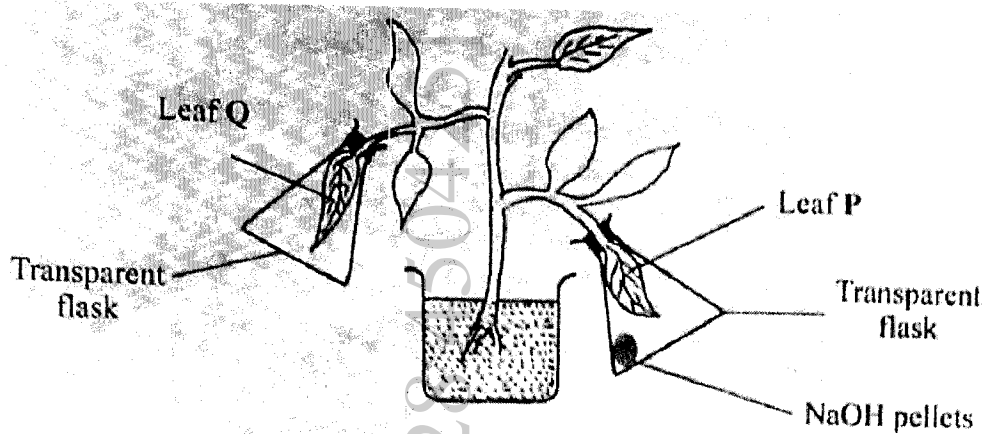
(b) Explain how you can set a control for the experiment.

(1mk)



Using boiled yeast suspension; ✓

15. In an experiment to investigate a factor affecting photosynthesis, a potted plant which had been kept in the dark overnight was treated as shown in the diagram below and exposed to light. The students performed a starch test to confirm if photosynthesis took place in the leaves P and Q.



a) Why was the potted plant kept in the dark overnight?

to destarch / remove starch from the leaves; (1mk) to remove all (stored) starch is used up;

(b) Explain the results obtained in the leaves labelled P and Q

(3 mks)

P- no starch was formed as no photosynthesis took place; because sodium hydroxide pellets absorbed carbon (IV) oxide; ✓

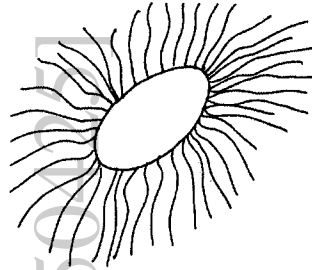
Q- starch was formed (as photosynthesis took place) because carbon (IV) oxide was in the flask; ✓

16. Name three support tissues in plant stems

(3 mks)

Xylem, ✓ collenchymas; ✓ sclerenchyma; ✓ rej. wrong spellings

17. The diagram below shows a seed of a certain plant.



(a) Name the likely agent of dispersal. (1mk)

Wind; ✓

(b) Give a reason for your answer. (1mk)

Presence of hair-like structures, ✓
hairy structures, ✓
flossy ✓

18. Name two classes of the phylum Arthropoda that have cephalothorax (2mks)

Crustacea; ✓
Arachnida; ✓
82% correct

19. (a) Name the source of hydrochloric acid in the mammalian stomach. (1mk)

Oxyntic cells/parietal cells; ✓
acc. Gastric glands

(b) Study the diagram of the mammalian tooth below and answer the questions that follow.



(i) Identify the tooth. (1mk)

Pre-molar; ✓
molar ✓

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

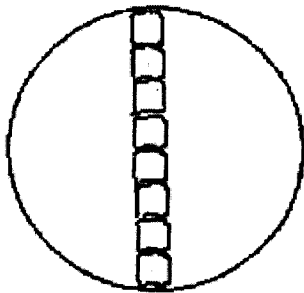
-has two roots/ has cusps/ has a broad surface; ✓
ridges ✓

- (c) State **one** adaptation of the tooth to its function. (1 mk)
-has two roots for firm anchorage into the jaw/ has cusps/broad surface to increase surface area for chewing/grinding food;

20. Name **one** condition caused by gene mutation (1 mks)
Albinism/ sickle-cell anaemia/ haemophilia/ colour blindness; rej. wrong spellings

21. Differentiate between intracellular and extracellular enzymes. (1 mks)
Intracellular- produced by a cell and used within e.g respiratory enzymes;
Extracellular- produced by a cell but used outside the cell that produces them, e.g digestive enzymes

22. During a practical lesson to estimate the size of a cell a student observed and sketched the diagram below. Using information from the sketch, calculate the length of one cell in micrometers given the field of view was 8mm in width.



$$\begin{aligned} \text{Length of cell} &= \frac{\text{Diameter of field of view in } \mu\text{m}}{\text{No. of cells along diameter}} \\ &= \frac{8 \times 1000}{8} = 1000 \mu\text{m} \end{aligned}$$

23. If pepsinogen and trypsinogen were produced in their active forms, what would be their effect on the alimentary canal. (1mk)

Will digest the alimentary canal; ✓
will digest the glands that secrete them/autodigestion

24. State the stage in meiosis where the following take place

- (a) Synapsis (1mk)

prophase I; ✓

- (b) Formation of two separate cells each with haploid number of chromosomes (1mk)

Telophase II

25. State the function of the following structures

(3mks)

i. Seminiferous tubule

Produces sperms; (has actively dividing cells that give rise to sperms)

iii. Prostate gland

Produces an alkaline fluid that neutralises acid in the vagina/~~urethra~~ /activates ~~sperms~~;

ii. Epididymis

(Provide site for) storage of sperms [muscular to contract and force sperms to sperm duct during ejaculation];

26. (a) What is meant by organic evolution

(1mk)

Emergence of complex life forms from simple life forms over along period of time. - is the emergence of new life forms from pre-existing simple forms gradually over a long period of time, to present complex life forms

(b) State **two** limitations in use of fossil records in retracing the evolutionary history of all modern day organisms

(2 mks)

*Some fossils have not yet been discovered;
- few fossils discovered; missing links due to decomposition / scavenging;
- Distortion of some fossils (by)*

27. State **two** ways in which knowledge of genetics has been applied by humans

(2 mk)

Genetic counseling, medical application like gene therapy, blood transfusion, crop and livestock production improvement (through genetic engineering)

(mark the first two)

28. State **two** advantages of metamorphosis to the life of insects

(2mks)

*- allows time for structural and morphological reorganization and development;
- reduces ^{competition} completion as each stage occupies a different niche hence improving survival;
- Enables organism to survive adverse environmental/harsh conditions*

29. State two types of immunity

(2 mk)

-Natural immunity/ innate immunity

-Acquired/artificial immunity

Innate / inherited immunity
Acquired

30. Give **three** features that make mammalian alveoli adapted to gaseous exchange (3 mks)

-have moist surfaces to dissolve respiratory gases hence increasing the diffusion gradient;

-are numerous to increase surface area for gaseous exchange;

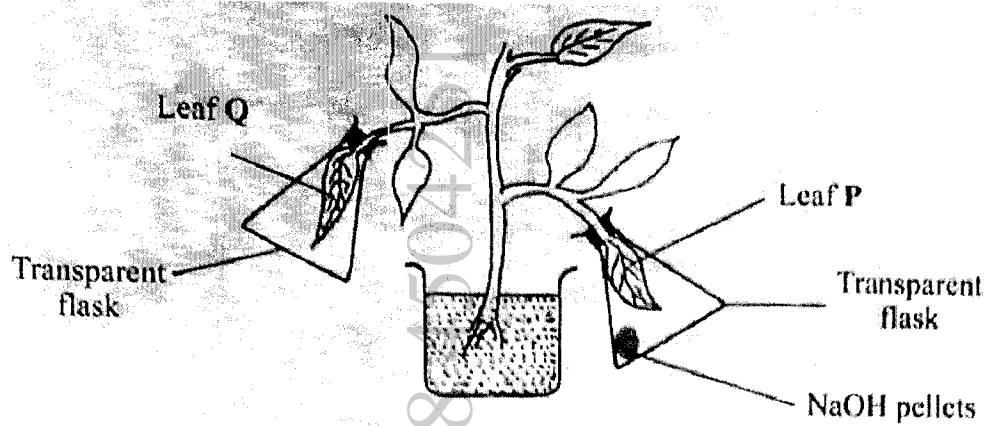
-have thin epithelium to reduce diffusion distance;

-highly vascularised to for efficient gaseous exchange (to bring in Carbon (IV) oxide and carry away oxygen) hence creating a steep diffusion gradient;

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(b) Explain the results obtained in the leaves labelled P and Q (3 mks)

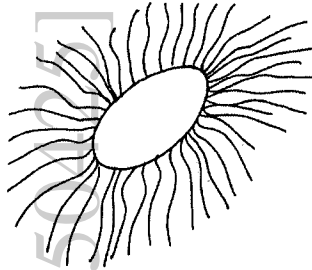
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