196-220

THE KENYA NATIONAL EXAMINATIONS COUNCIL
Kenya Certificate of Secondary Education

231/1 — BIOLOGY — Paper 1

Apr. 2021 – 2 hours

1771

Name ..... Index Number .....

Candidate's Signature ..... Date .....

Instructions to candidates

(a) Write your name and index number in the spaces provided above.
(b) Sign and write the date of examination in the spaces provided above.
(c) Answer all the questions in the spaces provided in this booklet.
(d) This paper consists of 12 printed pages.
(e) Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.
(f) 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	23	24	25	26	27

Grand Total 80

*Answer **all** the questions in the spaces provided.*

1. Name the taxonomic grouping that contains individuals with most similarities. (1 mark)

Species ;

2. Name the characteristic of living organisms shown by each of the following:

(a) budding in yeast; (1 mark)

(Asexual) reproduction ; Not Sexual

(b) enlargement of the eye pupil in dim light. (1 mark)

Irritability / Response (to stimulus) / Sensitivity

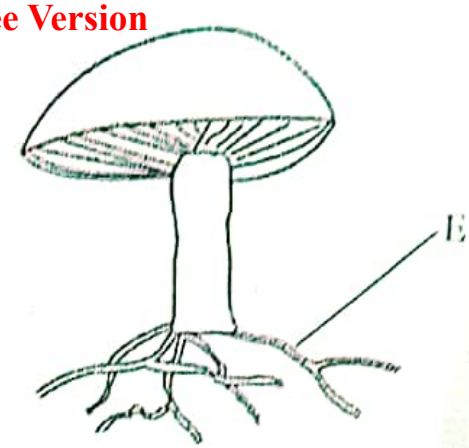
3. Explain why there is no grass in most dense forests. (2 marks)

Form Canopies / shadows / Shade ; which Prevent light from reaching grass ; grass die / fail to flourish due to their inability to Photosynthesize ; Any 2

4. State **one** structural difference between a cell wall and a cell membrane. (1 mark)

- Cell wall is (fully) permeable while cell membrane is semi-permeable (Cell wall has larger pores while Cell membrane has smaller pores)
- Cell wall is (mainly) made up of Cellulose (fibres) while Cell membrane has a (double) Protein layer layer sandwiching a lipid layer ; Acc. lipoprotein
- Cell wall is rigid / tougher (cannot burst) while cell membrane is weaker (bursts) ;

5. The diagram below shows an organism in a certain Kingdom.



(a) Name the Kingdom to which the organism belongs. (1 mark)

Fungi; Acc. fungi

(b) State the mode of nutrition for the organism. (1 mark)

Saprophytism / Saprophytic / feed on dead decaying (organic) matter; Res. Saprophyte

(c) (i) Name the part labelled E. (1 mark)

Hypha / Hyphae; Acc. mycellium, Rhizoids

(ii) State **two** functions of the part labelled E. (2 marks)

Secretes digestive enzymes (for external digestion);

Anchors the organism / mushroom (firmly) onto the substrate; Acc. anchorage.

Absorbs digested food materials / Absorbs water and mineral salts/ions;

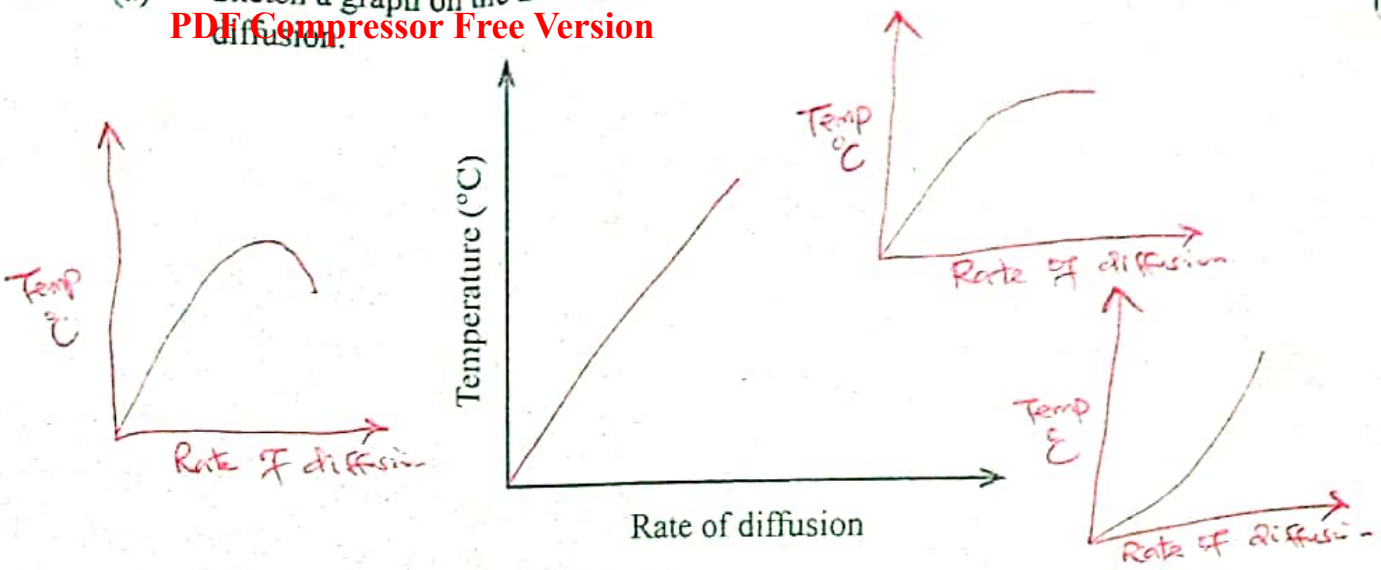
6. State the importance of a well developed blood capillary network in the alveoli. (1 mark)

Increases the surface area for (efficient) exchange / transport of respiratory gases (oxygen and carbon (IV) oxide);

7. Name the genetic disorder in humans that is characterised by inability of blood to clot. (1 mark)

Haemophilia; Acc. Hemophilia

8. (a) Sketch a graph on the axis below showing how temperature affects the rate of diffusion. (1 mark)



(b) Account for the shape of the sketch made in (a) above. (2 marks)

Tied to (a)

Plants are not The rate of diffusion increases with the increase in temperature; increase in temperature increases the kinetic energy of the (diffusing) molecules (increasing the rate of diffusion);

9. (a) Explain why plants have lower respiratory rates compared to animals. (1 mark)

Plants are less active than animals, hence require lower amount of energy than animals;

(b) State *two situations in plants* when the rate of respiration rises more than normal. (2 marks)

During germination (process); (to generate energy required for the

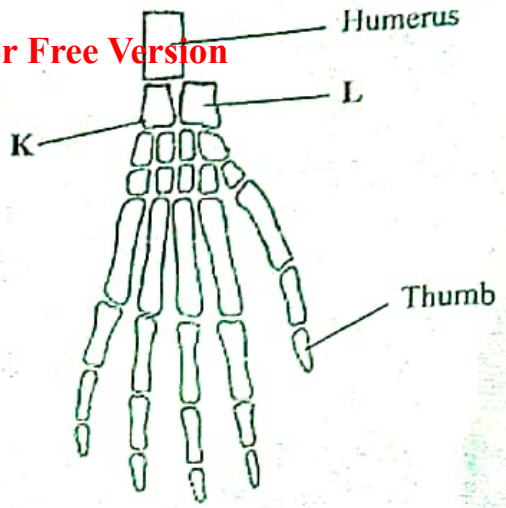
During rapid growth/cell division (at the tips of roots/shoots);

During active uptake/transport of substances (through the roots);

10. Explain why most plants growing in water-logged areas die before attaining maturity. (3 marks)

Waterlogging submerges the plant root system; Cutting off supply of oxygen to the roots/soil surrounding the roots; (aerobic) respiration in the roots is hampered; active uptake/transport of materials is affected (leading to the death of the affected plants);

11. The diagram below shows the plan of a pentadactyl limb.



Name the bones labelled **K** and **L**.

K Ulna; (1 mark)

L Radius; (1 mark)

12. With reference to germination explain:

(a) the meaning of the term imbibition; (1 mark)

(Rapid) Absorption of water by (germinating) seed (through the micropyle/seed coat);

(b) why the dry mass of the endosperm decreases while that of the embryo increases. (2 marks)

During germination, stored food in the endosperm is broken down/hydrolyzed/oxidized; to provide nutrients for the growing embryo;

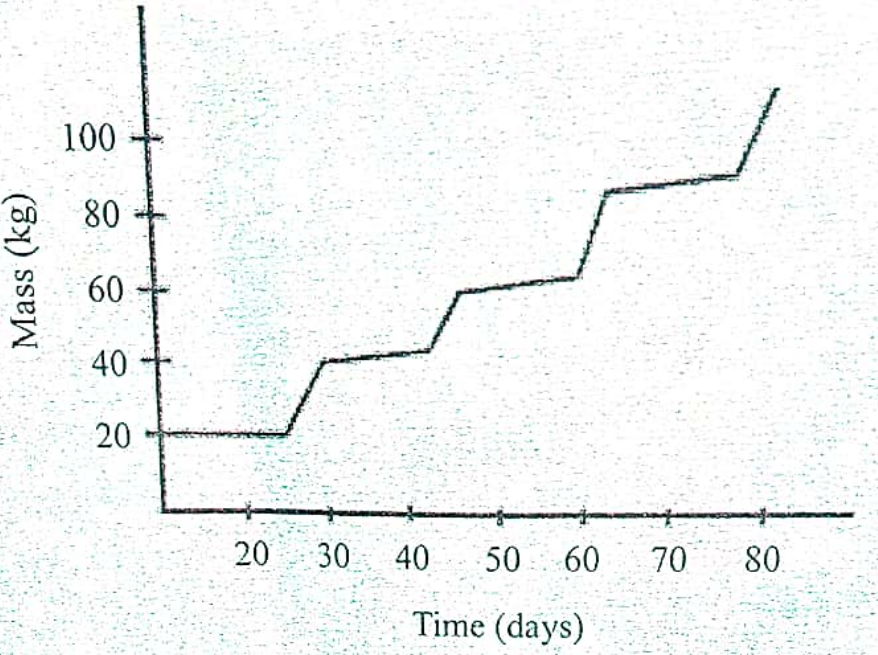
13. State **two** characteristic features used to classify members of Class Coniferales. (2 marks)

Presence of cones;

Naked seeds/seeds not enclosed in fruits

Xerophytic characteristics/needle-like leaves/thick waxy cuticle/sunken stomata;

. The graph below represents a growth curve in a certain Phylum.



(a) Name the type of growth curve shown. *(1 mark)*

8 Intermittent / Staircase (growth curve);

(b) Name the Phylum where members show the type of growth curve illustrated. *(1 mark)*

Arthropoda; Correctly spelt

Acc. arthropoda, Athropoda/athropoda Rej Anthropoda, anthropoda.

15. (a) State **two** limitations of using fossil records in retracing evolutionary history of living organisms. (2 marks)

Missing links due to complete decomposition of some organisms; Acc. Some parts decomposing

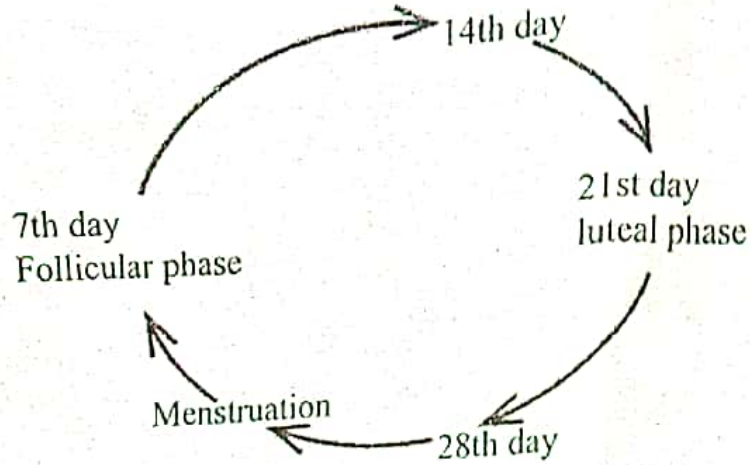
Distortion of parts during ~~geological~~ sedimentation;

Destruction of fossils by geological activities (earthquakes / faulting / mass movement of earth surfaces / volcanicity);

(b) Describe cell biology as an evidence of organic evolution. (3 marks)

Presence of similar cell organelles (mitochondria, ribosomes, lysosomes); Similar biological chemicals (ATP/Proteins/DNA); Similar blood pigmentation in tissues of some groups of animals show they have a common phylogenetic origin;

The illustration below shows a summary of the main phases of the human menstrual cycle.



(a) Name the process that takes place around the 14th day. (1 mark)

Ovulation;

(b) Name **two** hormones produced at the follicular phase. (2 marks)

Follicle stimulating hormone Rj FSH

Oestrogen / Estrogen

Luteinizing hormone Rj. LH

(c) Under which **two** conditions would the cycle be interrupted? (2 marks)

Sickness;

(Drastic) change in weather/environment;

Pregnancy / Implantation / Conception Rej fertilisation;

Emotional instability (anger, stress, anxiety);

17. State **two** reasons why blood reaching the glomerulus is always under high pressure. (2 marks)

Renal artery branches directly from (dorsal) aorta where blood is under high pressure; Afferent arteriole supplying blood to renal vessel is broader than efferent taking out blood;

18. During a clinical laboratory test, some sugar was detected in an individual's sample of urine.

Name:

(a) the hormone that was deficient in the patient; (1 mark)

Insulin ; Acc Ins

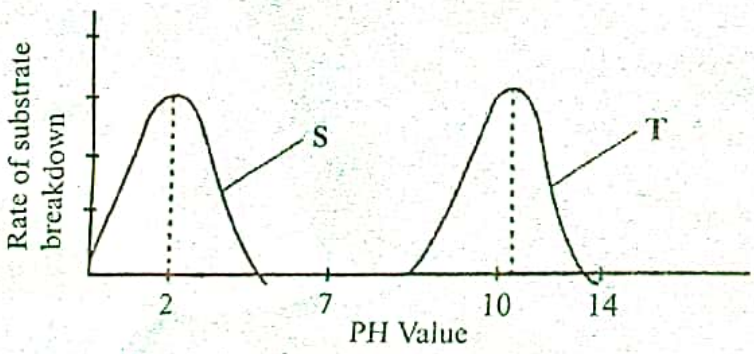
(b) the gland that produces the hormone named in (a) above; (1 mark)

Pancreas ; Acc Pancreas

(c) the disease the individual was likely to be suffering from. (1 mark)

Diabetes mellitus Rj. Diabetes alone

19. The graph below illustrates the effect of pH on certain protein-digesting enzymes, S and T.



(a) Name enzymes S and T.

S

Pepsin ; Acc Chymosin Acc. Rennin ; Rej. Renin/~~Chymosin~~ (1 mark)

T

Trypsin ; (1 mark)

(b) (i) Name the part of the alimentary canal where enzyme T is likely to be found.

Duodenum ; (1 mark)

(ii) Explain your answer in b(i) above. (2 marks)

Tied to (i)

In the duodenum, the medium is alkaline/basic ; favouring the optimal working of the enzyme (T) as illustrated .

20. Explain the biological significance of completing a dose of antibiotics. (3 marks)

To kill/destroy/remove (targeted) Pathogens; Since failure to take full dose accords the Pathogens an opportunity to develop resistance to the drug; the Pathogen mutates (over time)/giving rise to new strains; finally the drug becomes ineffective;

21. State two reasons why females with Turners' Syndrome are infertile. (2 marks)

They lack ovaries;

Have small uterus;

Less number of chromosomes;

22. (a) Define the term "*field of view*" as used in microscopy. (1 mark)

A circular area seen (on the stage) when focusing/viewing through the eyepiece of a microscope;

(b) State two functions of the body tube of a light microscope. (2 marks)

~~Carries~~; ~~during~~ ~~cold/low temperatures~~; ~~to conserve heat~~;

Holds the revolving nosepiece/objective lenses in place;

Holds the ocular/eyepiece (lens) in place;

(c) Give a reason why it is not advisable to use water in cleaning a microscope. (1 mark)

To avoid rusting;

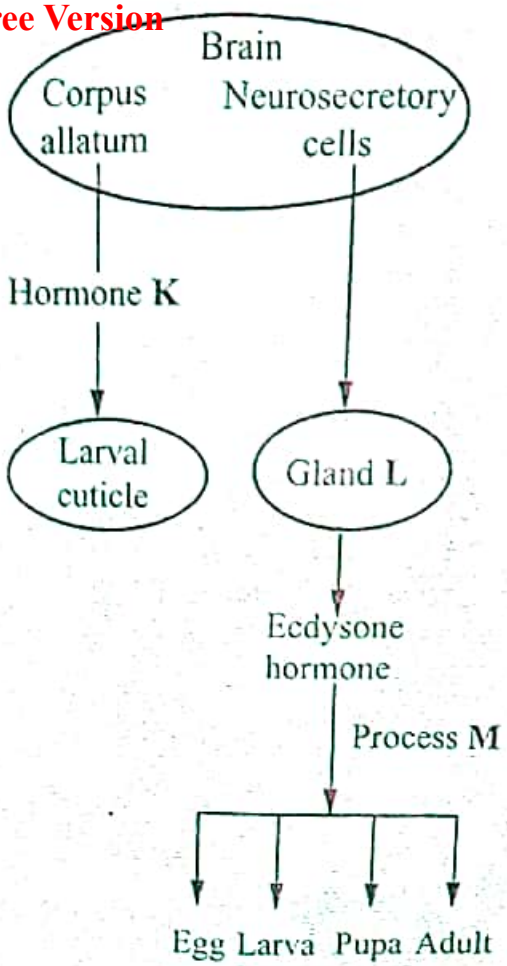
To avoid interference with visibility of the lens;

23. Explain the role of blood capillaries in thermoregulation. (2 marks)

Constrict during cold/low temperatures; to conserve heat;

Dilate during hot/high temperature; to facilitate heat loss;

24. The illustration below shows the effect of hormones on insect growth and development.



(a) Name:

(i) the hormone K (1 mark)

Juvenile (hormone);

(ii) gland L that produces ecdysone hormone. (1 mark)

Prothoracic (gland);

(b) State the role of ecdysone hormone in the growth and development of insects. (1 mark)

Ecdysone (hormone) causes metamorphosis; or causes the larval stage (of an insect) to change/metamorphosize into pupa and pupa into adult;

(c) (i) Name process M (1 mark)

Complete metamorphosis ;

(ii) Account for the rapid increase in size of organisms immediately after moulting. (2 marks)

During moulting (the tough/hard impermeable) exoskeleton is shed ; allowing the (soft permeable) larvae to take in air/water leading to rapid growth (which in turn ~~increases~~ results to increase in size of the organism) ;

25. (a) Complete the table below on the adaptations and functioning of some structures in a dicotyledonous stem. (2 marks)

Part	Adaptation
Cambium	(Small) Cells with dense cytoplasm to enable rapid mitotic division/giving rise to secondary growth ;
Parenchyma	Have thin wall for faster passage of materials ; Have large vacuole/irregular shape for storage/provide space for packing ;

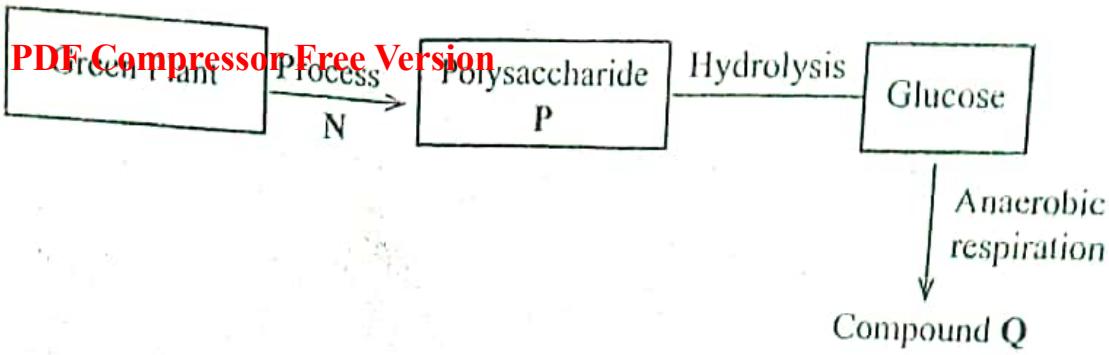
(b) Explain why the leaf of a sisal plant has a thick and shiny cuticle. (2 marks)

(Sisal is a xerophyte) the thick cuticle enables it to conserve water, reduce water loss ; It is shiny to reflect light, minimizing evaporation by radiation ;

26. *Explain why an individual with blood group AB can only donate blood to an individual with the same blood group.* (2 marks)

The individual's blood has both antigens A and B ; which will coagulate/agglutinate with antibodies a and b ; found in individuals with blood groups A, B and O ; CWTTE

27. The diagram below illustrates a set of biological processes in a green plant.



(a) Name:

(i) process N

Photosynthesis ; (1 mark)

(ii) polysaccharide P

Starch ; (1 mark)

(b) State two conditions necessary for the formation of compound Q. (2 marks)

Respiratory enzymes

Absence / little oxygen

(c) State two environmental conditions necessary for process N to take place. (2 marks)

Optimum temperature

Light

Water / Moisture

Carbon (IV) oxide

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