BIOLOGY MOCKS

For marking schemes,call/whatsapp mdm Mariam@0746711892

'an investment of knowledge pays'

For marking schemes,prefer calling Mdm Mariam:0746711892

Other available resources are;

- well summarised primary and secondary notes
- F1-F4 termly exams
- primary exams
- KCSE past papers
- KCPE past papers
- Mocks
- lesson plans
- schemes of work

Note:Exam questions are always free of charge

Marking scheme are not free

CENTRAL KENYA NATIONAL SCHOOLS JOINT MOCK

Kenya Certificate of Secondary Education

BIOLOGY

PAPER 1

(THEORY)

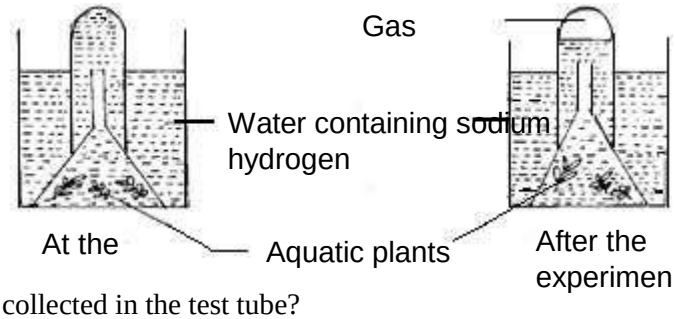
TIME: 2 HOURS

1. (i) What biological knowledge or study is required in dealing with locusts that infest a maize crop. (1 mark)

(ii) State the functions of the following cell structures. (2 marks)

(a) Sap vacuole. (b) Nucleolus.

2. Which **two** classes of phylum arthropoda have their head fused with the thorax? (2 marks)
3. (a) Name the part of the eye in which the light sensitive cells are located. (1 mark)
   (b) List the **two** types of sensory cells found in the part named in (a) above. (2 marks)
4. (a) Name **two** raw materials for the dark stage process of photosynthesis. (2 marks)
   (b) The set up shows an experiment to investigate photosynthesis.



(a) What gas was collected in the test tube? (1 mark)

(b) What was the role of sodium hydrogen carbonate in the experiment? (2 marks)

5. State **three** adaptations of the phloem tissue. (3 marks)
6. (a) State **one** structural and one functional difference between motor and sensory neurone. (2 marks)
   (b) What name is given to the gap between the sensory neurone and intermediate neurones. (1 mark)
   (c) Name the transmitter substance found in the gap named in (b) above. (1 mark)
7. Name **two** enzymes and **one** metal ion that are needed in the blood clotting process. (3 marks) Enzymes. Metal ion
8. Name causative agents of each of the following diseases.
   (a) Typhoid
   (b) Malaria
9. Name **three** properties of the cell membrane. (3 marks)
10. (a) Define the term carrying capacity. (1 mark)

(b) The table below gives information about an aquarium community which is ecologically balanced.

Type of organism	Dry weight (g)

Insect larvae	500
Fishes	5000
Water plants	5000
Bacteria	10

(c) What do you understand by term ecologically balanced? (1 mark)

11. List the changes that takes place during inhalation in the breathing cycle of mammal in the following. (4 marks)
    (a) Ribcage and thoracic cavity.
    (b) Diaphragm
    (c) External intercostal muscles.
    (d) Internal intercostal muscles.
12. Name the fins that prevent the following movements of fish during swimming. (3 marks)
    (i) Yawing
    (ii) Pitching
    (iii) Rolling
13. (a) Give an example of a sex linked trait in humans. (2 marks)
    Y chromosome.

    X chromosome.

(b) Write the types of gene mutation represented by the following analogues. (2 marks)

(i) Intended message BRING THERMOS ON OUTING

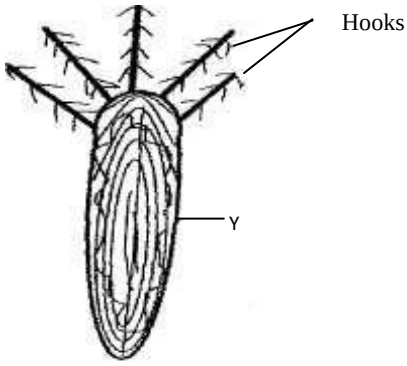
Actual message BRING MOTHERS ON OUTING

Type _____

(ii) Intended message PLEAS SAY WHERE YOU ARE
Actual message PLEASE STAY WHERE YOU ARE

Type

14. Use the diagram below to answer the questions that follow.

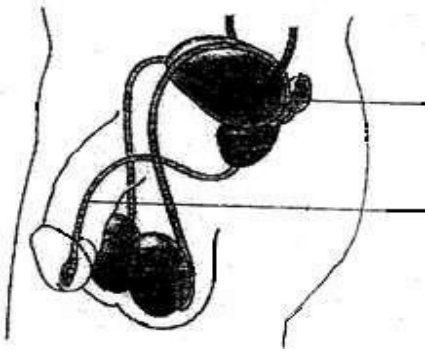


(a) Name structure labelled **Y**. (1 mark)

(b) (i) State the agent of dispersal for the structure above. (1 mark)

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

15. The diagram shown below represents a male reproductive system.



(a) Name the structure labelled **X**. (1 mark)

(b) Name **two** substances that pass through structure labelled **Y**. (1 mark)

16. Name the type of response shown by: (3 marks)
    (a) Leaves of Mimosa pudica when they fold after being touched.
    (b) Sperms when they swim towards ovum.
    (c) Euglena when they swim towards the source of light.

17. Give **two** reasons why the pressure of blood is greater in the arteries than in the veins in mammals. (2 marks) 18. What happens when respiration exceeds photosynthesis in the guard cells of terrestrial plants? (3 marks)

19. The leaf of a potted green plant which had been kept in dark for 24 hours was smeared with petroleum jelly on its lower surface and then exposed to sunlight for 6 hours. Starch test on the leaf was negative. Account for the observation.

(2 marks)

20. State the importance of the structure given below in a seed.
    (a) Endosperm. (1 mark)
    (b) Testa. (1 mark)

21. (a) State **two** disadvantages of self pollination in plants. (2 marks)
    (b) Explain why the tube nucleus disintegrates just before reaching the embryo sac. (1 mark)

22. (a) State the circulatory system found in members of the class insecta. (1 mark)
    (b) Name the blood vessels that transport blood from: (2 marks)
        (i) Small intestine to the liver.
        (ii) Lungs to the heart.

23. Two populations of the same species of birds were separated over a long period of time by an ocean. Both populations initially fed on insects only but later it was observed that one population fed entirely on fruits and seeds although insects were available. Name;
    (a) The type of isolation. (1 mark)
    (b) The type of evolutionary change. (1 mark)
    (c) What are vestigial structures? (1 mark)
    (d) Name **one** vestigial structure in man. (1 mark)

24. Eight potato cylinder of the same size were used to investigate a certain physiological process. Four of the potato cylinders were placed in solution S. The other four potato cylinders were placed in solution T. After 2 hours, the potato cylinders from solution S were found to longer and stiff, while those from solution T were found to be shorter and flexible. Explain the results in solution S and T. (2 marks)

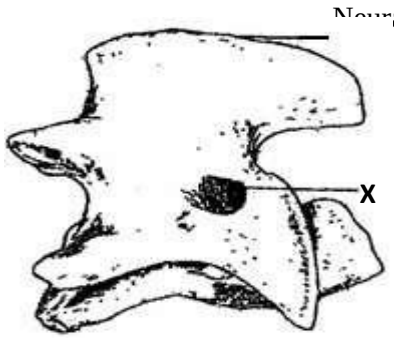
(b) Distinguish between active transport and diffusion. (2 marks)

25. Why is the pancreas considered a dual gland? (2 marks)

26. List **two** enzyme that are secreted in their precursor forms. (2 marks)

27. State **two** effects of gibberellins on shoots of plants. (2 marks)

28. The diagram below represents a type of bone in the mammalian skeleton.



(a) Identify the bone illustrated in the diagram. (1 mark)

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

CENTRAL KENYA NATIONAL SCHOOLS JOINT MOCK
Kenya Certificate of Secondary Education
BIOLOGY
PAPER 2
(THEORY)
TIME: 2 HOURS

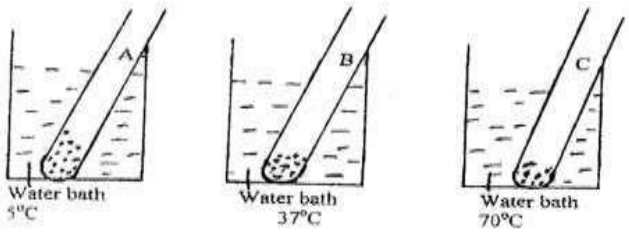
Answer all the questions in this section in the spaces provided:

1. Sickle cell anaemia is a hereditary disease due to a recessive gene which changes normal haemoglobin (Hb – A) to abnormal haemoglobin (Hb – S). The red blood cells of people with sickle cell anaemia are sickle shaped.

(a) What are the possible phenotypes of the offsprings of a man who is heterozygous and a woman who is also heterozygous?
Show your working. (5 marks)

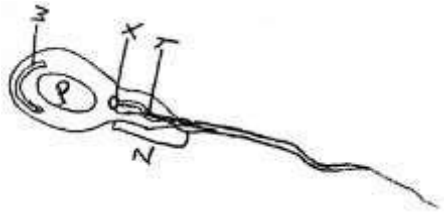
(b) Sickle cell trait is more prevalent in tropical countries than in temperate countries. Give an explanation for this observation.
(3 marks)

2. Three tubes each containing 1ml saliva and 1ml water were incubated in water baths at different temperatures as shown in the diagram below for 30 minutes. Another one tube containing 1ml starch solution was incubated for the same length of time in each water bath. The contents of the two tubes in each water bath was then mixed and incubated for further 30 minutes. The content of each tube was then tested for starch using iodine solution.



(a) What was the aim of the experiment? (1 mark)
(b) Why was it necessary to incubate the tubes for 30 minutes before mixing their contents? (1 mark)
(c) State the colour changes you would expect to observe after adding iodine solution. (3 marks)
(d) Account for the expected observations. (3 marks)

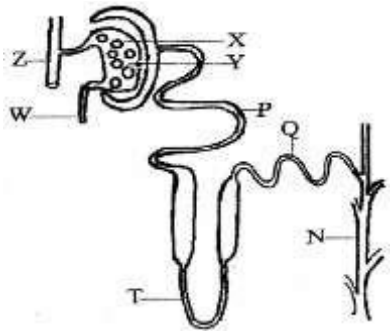
3. Below is a diagram of a sperm cell.



(a) Identify parts labeled **X** and **Y**. (2 marks)
(b) Explain how parts **W** and **Z** adapt the cell to its function. (4 marks)

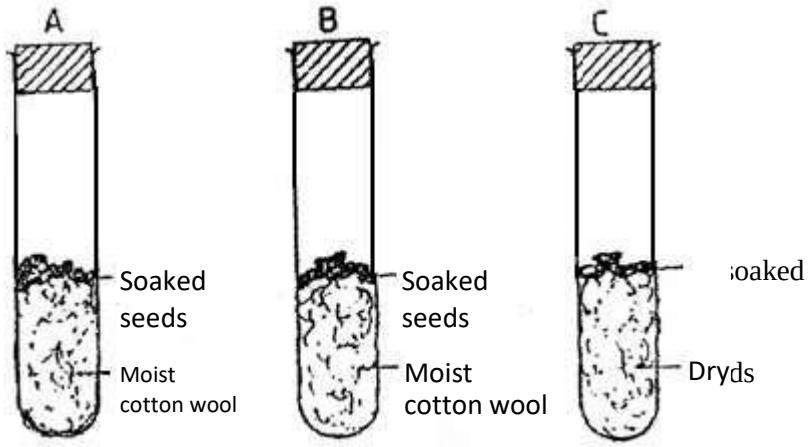
(c) Using letter **P** identify or label on the diagram the part of the cell rich in DNA. (1 mark)
(d) State the function of part **X**. (1 mark)

4. The figure shown below represents a kidney nephron. Use it to answer the questions that follow.



(a) (i) **X** is made up of a tuft of capillaries. How do they differ from other capillaries in the body? (1 mark)
(ii) What structural difference exist between **W** and **Z**? (1 mark)
(iii) State the significance of the difference stated in (a) (ii) above. (1 mark)
(b) State **three** adaptations that enable **P** to perform its function. (3 marks)
(c) What is counter flow and in which part of the nephron does it occur. (2 marks)

5. The diagrams below represent a set up to investigate the conditions necessary for seed germination.



At room temperature | At O□C | At room temperaturee

The set was left for 7 days.

(a) What conditions were being investigated in the experiment? (2 marks)
(b) State **three** reasons for soaking seeds in set ups **A** and **B**. (3 marks)

(c) What were the expected results after seven days? (3 marks)

Step A

Step B

Step C

SECTION B: (40 MARKS)

Answer question **6 (Compulsory)** and **either** question **7** or **8** in the spaces provided after question **8**.

6. An experiment was carried out to investigate the effect of hormones on growth of lateral buds of three pea plants. The shoots were treated as follows.

(a) Shoot A – Apical bud was removed.

(b) Shoot B – Apical bud was removed and gibberellic acid placed on the cut shoot.

(c) Shoot C – Apical bud was left intact.

The lengths of the branches developing from the lateral buds were determined at regular intervals. The results obtained are shown in the table below.

Time in days	Length of branches in millimeters		
	Shoot A	Shoot B	Shoot C
0	3	3	3
2	10	12	3
4	28	48	8
6	50	90	14
8	80	120	20
10	118	152	26

(i) Using the same axes, draw graphs to show the lengths of branches against time.(8 marks)

(ii) (a) What was the length of the branch in Shoot B on the 7^{th} day? (1 mark)

(b) What would be the expected length of the branch developing from Shoot B on the 11^{th} day?

(iii) Account for the results obtained in the experiment. (6 marks)

(iv) Why was Shoot C included in the experiment? (1 mark)

(v) What is the importance of gibberellic acid in agriculture? (1 mark)

State **two** physiological processes that are brought about by the application of gibberellic acid on plants. (2 marks)

7. Describe the role of hormones in the mammalian female reproductive cycle. (20 marks)

8. Explain how structures of the human ear are adapted to their functions. (20 marks)

CENTRAL KENYA NATIONAL SCHOOLS JOINT MOCK
231/3

BIOLOGY

PAPER 3

(PRACTICAL)
TIME: 1¾ HOURS

CONFIDENTIAL TO SCHOOLS:

Each candidate will require the following:

- 15ml of 5% Bromothymol Blue.
- Lime water (calcium hydroxide) labeled solution X.
- A drinking straw.
- 2 test tubes.
- 10ml measuring cylinder.
- Boiling tube.
- Large bean seed soaked overnight labeled R1.
- Large maize grain soaked overnight labeled R2.
- Scalpel or razor blade.
- Iodine solution provided with a dropper.
- Dilute hydrochloric acid.
- Dilute sodium hydroxide.
- Hand lens.
- Distilled water provided in a wash bottle.
- 2 droppers.

NB: Bromothymol blue stock solution is 0.04g in 6 – 4ml N/100 NaOH, 73.6ml distilled water and 20ml absolute ethanol 5% Bromothymol blue is made by adding 95ml of distilled water to 5ml of stock solution.

CENTRAL KENYA NATIONAL SCHOOLS JOINT MOCK
Kenya Certificate of Secondary Education
BIOLOGY
PAPER 3
(PRACTICAL)
TIME: 1¾ HOURS

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1. You are provided with the following:

- 25ml Bromothymol blue.
- Solution X.
- A drinking straw.
- 2 test tubes.
- 10ml measuring cylinder.
- A boiling tube.
- Dilute hydrochloric acid.

- Dilute sodium hydroxide.

(a) Place 2ml of Bromothymol Blue (B.T.B) in a clean test tube. Add dilute hydrochloric acid drop by drop and shake after each drop till there is a permanent colour change.

(i) State the resulting colour. (1 mark)

(ii) To the mixture obtained above, now add sodium hydroxide solution drop by drop until there is a colour change. Record your observation. (1 mark)

(iii) From your observations in (a)(i) and (a)(ii) above what is the nature of Bromothymol blue. (1 mark)

(b) Place 10ml of fresh Bromothymol blue in a boiling tube. Using the drinking straw, bubble air through the bromothymol blue until there occur colour change.

(i) Record your observation. (1 mark)

(ii) What does the colour obtained in (b)(i) above suggest about the nature of the gas breathed out? (1 mark)

(c) Rinse the measuring cylinder and use it to place 2ml of solution X in a clean test tube. Rinse the drinking straw used in (b) above and use it to bubble air through solution X.

(i) Record your observation. (1 mark)

(ii) Suggest the identity of solution X. (1 mark)

(iii) Suggest the identity of the gas that gave rise to the observation above. (1 mark)

(d) (i) Name the physiological process in cells that leads to formation of the gas named in c(iii) above. (1 mark)

(ii) Write down a word equation for the process named in d(i) above. (2 marks)

(iii) What is the importance of the identified process in cells of living organisms? (1 mark)

2. Study the photographs and answer the following questions.



PLATE 5



PLATE 6



PLATES 7

(I) The photograph in Plate **5** shows the germination process in a species of legume.

(a) (i) Name the type of germination shown in the photograph. (1 mark) (ii) Give a reason for your answer. (1 mark)

(b) Other than germination the seedling have shown some responses.

(i) Name **two** responses shown in the photograph. (2 marks)

(ii) State **one** survival value of each of the response named above. (1 mark)

(II) Examine the photograph in Plate **6** and Plate **7** which show different essential parts of a flower of a species on two different plants.

(a) Name the flower parts shown in Plate **6** and Plate **7**. (2 marks)

(b) (i) Name the phenomenon described in the statement above. (1 mark)

(ii) Explain the significance of the phenomena stated in (a)(i) above. (1 mark)

(c) (i) State the mode of pollination of the flower shown in the photograph. (1 mark)

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

(d) (i) State the type of pollination of the flower shown in the photograph. (1 mark)

(ii) Give **two** reasons for your answer. (2 marks)

3. The photographs in Plate **J**, **K** and **L** shows the anterior part of two different animals, Plate **L** shows the longitudinal dissection of Plate **K**. Examine the photographs and answer the questions below.



PLATE J PLATE K



(a) (i) State the class to which the animal organ in Plate **J** belongs. (1 mark)

(ii) State the habitat of the animal. (1 mark)

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

(b) (i) Name the organ shown in the photograph in Plate **J**. (1 mark)

(ii) State the function of the organ named above (i). (1 mark)

(iii) Name the structure that protects the organ named in (b(i) above from mechanical damage . (1 mark)

(iv) From observable features only explain three adaptation of the organ to its function. (3 marks)

(c) (i) Identify the structure in the photograph Plate **K** and **L**. (1 mark)

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

(iii) Using observable features only state three adaptations of the structure to its functions. (3 marks)

GATUNDU SUB COUNTY DISTRICT FORM FOUR EVALUTION EXAMINATION

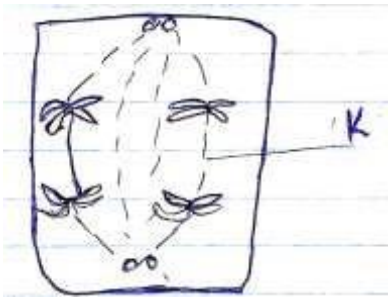
231/1

BIOLOGY

PAPER I

(Theory)

1. State the importance of each of the following in living organisms. (2 marks)
   i) Respiration ii) Reproduction
2. State function of the following in seed. Germination. (3 marks) i) Water ii) Enzymes iii) Oxygen
3. Distinguish between identical twins and fraternal twins. (2 marks)
4. The diagram below represents a stage during cell division.



   i) Identify the stage of cell division. (1 mark) ii)
   Give two reasons for your answer (a) above. (2 marks)
   iii) Name the structures labeled K. (1 mark)
5. State three roles of Gibberellins hormone in plant. (3 marks)
6. (i) The diameter field of view of a light microscopic is 6.5mm. Plant cells lying across the diameter are 12.
   Determine the size of one cell in micrometers. (2 marks)
   (ii) Explain how drooping of leaves on a hot sunny day is advantageous to a plant. (1 marks)
7. Distinguish between diffusion and osmosis. (2 marks)
8. State the changes that occur in a nerve axon to produce an action potential. (3 marks)
9. (i) Name the gaseous exchange surface in insects. (1 mark)
   (ii) State two ways the surface named in (a) above is suited to its function. (2 marks)
10. $5C_{51}H_{98}0_6 + 145\ O_2 \longrightarrow 102\ CO_2 + 98\ H_2O$

    The above equation shows an oxidation reaction of food substances.
    a) What do you understand by the term respiratory quotient? (1 mark)
    b) Determine respiratory quotient of the oxidation of food substances. (1 mark)
    c) Identify the food substances. (1 mark)
11. State one function of each of the following parts of a mammalian ear.
    a) Pinna (1 mark)
    b) Tympanic membrane (1 mark)
    c) Vestibule (1 mark)
12. State one structural and one functional difference between motor and sensory neurones. (2 marks)

-
Structural difference – -
Functional difference –

13. i) Distinguish between a community and a population (2 marks)
    ii) State two measures that can be taken to control infection of man by protozoan parasites. (2 marks)

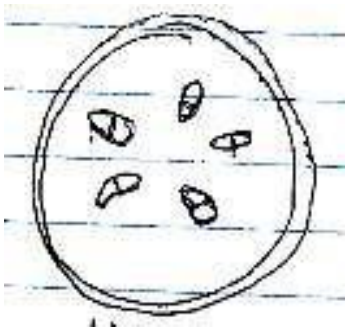
(2 marks)

ii) State two structural differences between biceps muscles & muscles of the gut.

16. a) Explain why Lamarck's theory of evolution is not accepted by biologists today. (2 marks)

b) State two pieces of evidence that support the theory of evolution. (2 marks)

17. The diagram below shows a section through plant organ.



14. i) Pregnancy continues if the ovary of an expectant mother is removed after 4 months. Explain. (2 marks)

ii) What is the role of testes in the mammalian reproductive system? (2 marks) 15. i) State two ways in which skeletal muscles fibres are adapted to their function. (2 marks)

a) (i) Name the class of the section was obtained. (1 mark)

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

b) What is the role of vascular bundles in plant nutrition? (2 marks)

18. The following is a dental formula of a dog and rabbit, state two differences between them. (2 marks)

$$\text{Dog: } I\ \frac{3}{3}\quad C\ \frac{1}{1}\quad PM\ \frac{4}{4}\quad M\ \frac{2}{3}$$

$$\text{Rabbit: } I\ \frac{2}{1}\quad C\ \frac{0}{0}\quad PM\ \frac{3}{2}\quad M\ \frac{3}{3}$$

19. The figure below illustrates a portion of a chromosome with genes named A, B, C, S, Q and R

A	B	C	S	Q	R

Use the diagrams similar to the one above to illustrate the changes if the above chromosome undergoes the following mutations affecting only gene C and S.

(i) Deletion (1 mark)

(ii) Inversion (1 mark)

20. Name the disease characterized by

Glycosuria (2 marks)

Diuresis (1 mark)

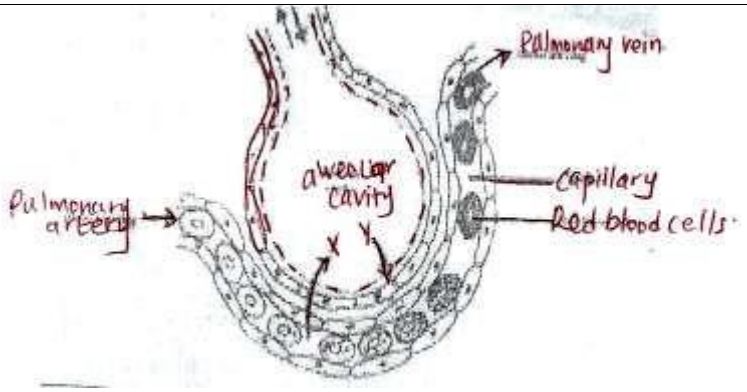
21. State the importance of each of the following features in animals; a) (2 marks)

Solid food being broken down into small pieces.

b) Presence of caecum in herbivorous mammals.

22. ance that accumulates in muscles when respiration occurs with insufficient oxygen. (1 mark)

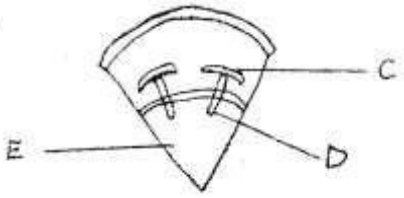
23. The diagram below represents gaseous exchange in the alveolus



a) Mention the path followed by gas y from alveolar space until it reaches the red blood cells.

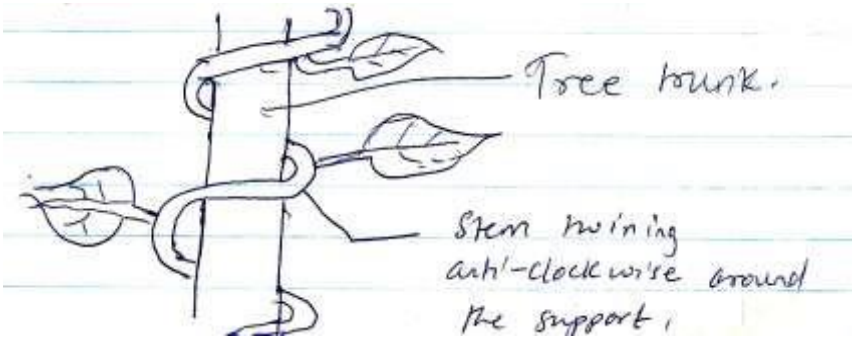
24. Explain how water from the soil is gained by root hair in plants. (2 marks)
25. In what form is carbon IV oxide transported in blood. (1 mark)

26. The diagram below shows a section of a dicotyledonous stem.



Name the type of cells found in part labeled E. (1 mark)

27. State three features that a grasshopper, a crab, a spider and a millipede have in common. (3 mark) 28. State two characteristics of Eukaryotes. (2 marks)
29. A cell organelle can be thought of as a —bag‖ full of —liquid‖, the —liquid‖ being the —background‖ substance that holds other structures within the —bag‖. Distinguish between the —background‖ substance of a mitochondria and
that of a chloroplast. (2 marks)
30. The figure below shows a stem of a plant growing round a tree trunk



a) What is the name of the response which causes such a twisted growth? (1 mark)
b) Explain how twisting process is accomplished (2 marks)

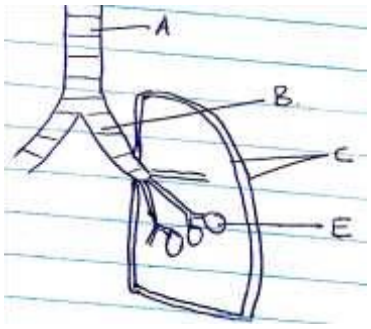
GATUNDU SOUTH SUB-COUNTY FORM FOUR EVALUATION EXAM
231/2
BIOLOGY
PAPER 2
(THEORY)
2HRS

1. The genetic disorder hemophilia is due to a recessive sex linked gene .A man who is hemophilia marries a woman who is carrier for the condition.
   a) Using letter H to represent the normal condition and letter h for the hemophiliac condition.

i) What is the genotype for the man and the woman? (2marks) ii) Work out a cross between the man and woman (3marks) b) What is the chance that both the first and second sons will be hemophiliac? (2marks)

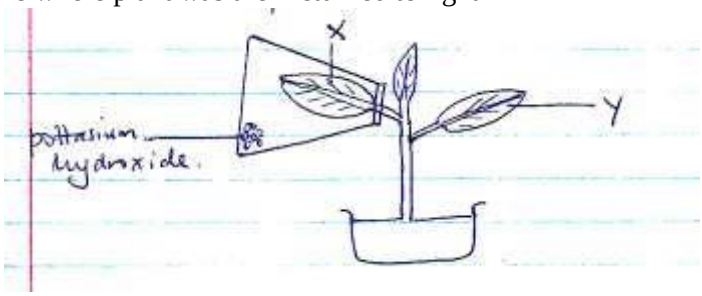
c) Hemophiliac is more common in males than in female human .Explain (1mark)

2. Study the diagram below and answer the questions that follow.



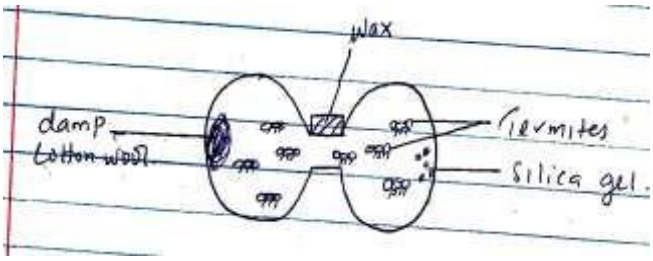
   a) Name the part labeled A and B
      (2marks)
   b) State the function of the part labeled C
      (2marks)
   c) How is he part labeled E adapted to its function
      (2marks)
   d) Indentify the structure that perform the same function as one illustrated above in
      (2marks) i) Amoeba --- ii) Fish ----

3. A health plant was kept in the dark for 48 hrs .Then one of its leaves (x) was enclosed in a glass flask as down below .The whole plant was then returned to light



   a) After 48 hrs the leaves were tested for starch .What observations do you expect.
      (2marks)
   b) i) What conclusions can you draw from this observation
      (1mark) ii) Explain your conclusion in b (i) above
      (2marks)
   c) Why was the plant kept in the dark for 48 hrs
      (1mark)
   d) State two ways in which the green leaves are adapted for gaseous exchange
      (2marks)

4) The set up below was used to demonstrate a certain behavior of termites



a) State the function of the following in this experiment

i) Damp cotton wool (1mark) ii) Silica gel (1mark) iii) Wax (1mark)

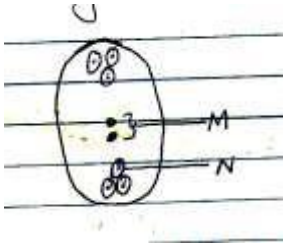
b) What result were obtained from this experiment after 12 hrs (1mark)

c) Account for the results in (b) above (1mark)

d) Name the type of response shown by termites (1mark)

e) What material wound is missing in a control experiment (2marks)

5 Below is a diagram of a structure found in plants



a (i) Indentify the structure (1mrk)

(ii) Name the parts labeled M and N(2mrks)

b) Explain why cross pollination is more advantageous to a plant species than self –pollination (2marks)

c) Explain how double fertilization takes place in the above structure. (3marks)

SECTION B;(40 MRKS)

Answer question 6(compulsory)and either question 7 or 8 in the space provide after question 8 .

6 An investigation of haemolysis of human red blood cell was carried out .Red blood cells were placed in sodium chloride solution and percentage of haemolysed cell established.

Sodium chloride conce .g/cm^3(%)	0.33	0.36	0.38	0.39	0.42	0.44	0.48
Haemolysed red blood cells (%)	100	91	82	69	30	15	0

a) (i) Using the data above, plot a graph of haemolysed red blood cell against salt concentration (6marks)

(ii) At what percentage of sodium chloride was the number of haemolysed cells equal to those that are not haemolysed.

(1mark)

(iii) What is the percentage of cells haemolysed at salt concentration of 0.45 percent. (1 mark) b) Account for the result obtained at

i) 0.33% salt concentration (2marks) ii) 0.48% salt concentration (2marks) iii) Suppose the red blood cells were placed in 0.50%salt concentration .Explain what would happen (2marks) c) i) Distinguish between lymphocytes and phagocytes (2marks)

ii) State two ways in which white blood cells defend the body against infections. (2 marks)

d) State two adaption of red blood (2marks)

7 a) Explain the role of the following hormones in growth and development of plants.
(i) Auxins (4marks)
(ii) Gibberellins (4marks)

8 Explain the adaptation of the small intestine to their functions.
(20marks)

GATUNDU FORM 4 EVALUATION EXAM
BIOLOGY PRACTIACL 231/3
CONFIDENTIAL.

1. The photographs must be coloured.
2. Each student to be provided with a ripe tomato labeled as specimen K.
   - a small beaker
   - a scapel
   - a dropper
   - at least 3 test tubes
   - access to; Iodine solution
     Benedict's solution
     DCPIP
     Source of heat and a test tube holder.

Source of heat.

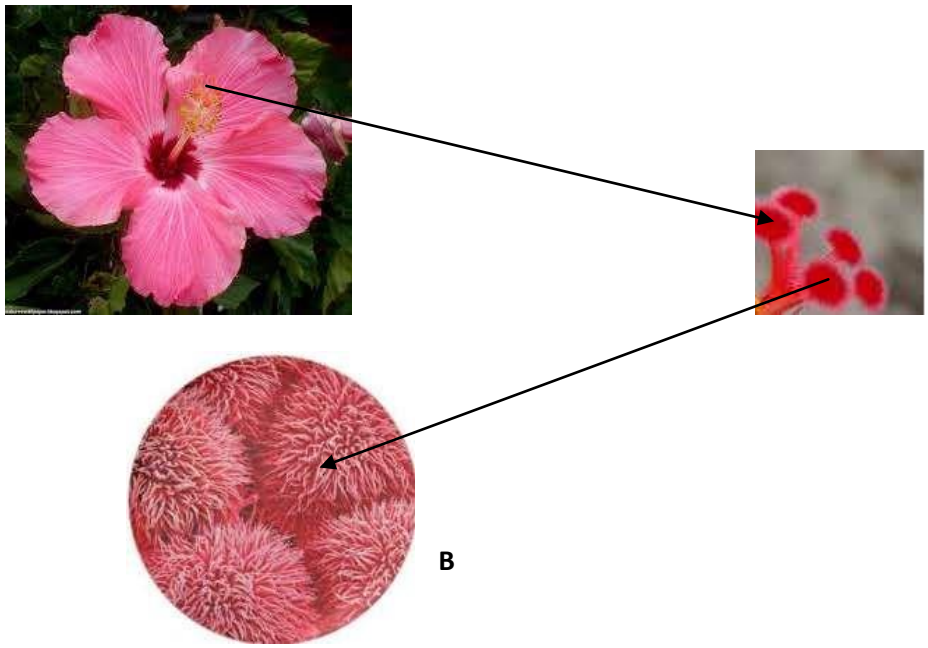
GATUNDU FORM 4 EVALUATION EXAM
BIOLOGY

PRACTICAL

231/3

1.

A



B

a) Name the sub-division of the plant from which the photo was taken. (1 mark)
b) Using observable features on the photograph give reasons for your answer in (a) above. (2 marks)
c) Name the agent of pollination for the flower in the photograph (1 mark)
d) State three observations on the photograph that supports your answer in (c) above. (3 marks)
e) Name the class of the plant from which the photo was taken. (1 mark)
f) Using observable features on the photograph, give three reasons for your answer in (e) above. (3 marks)
g) Give two adaptations of the part labeled B to its pollination function. (2 marks)

2.



Y





(i) To which phylum does organisms x,y and z belong to. (1 mark)
(ii) Name the classes to which X, Y and Z belongs to. (3 marks)
(iii) Give two important economic roles of specimen Y. (2 marks)
(iv) Give three harmful effects of specimen X to animals. (3 marks)
(v) With reasons identify two modes of locomotion of specimen Y . (4 marks)

3. (i) What part of plant is specimen K? (1mark)
(ii) Give a reason for your answer in 3 (i) above. (1mark)
(iii) Make a cross section of specimen K. Draw and label the parts. (3marks)
(iv) State the type of placentation in specimen K. (1mark)
(v) Name the agent of dispersal of specimen K and give a reason for your answer. (2marks)
(vi) Squeeze the juice from specimen K. Using the reagents provided, carry out food tests. (6marks)

FOOD/TEST	PROCEDURE	OBSERVATIONS	CONCLUSION

MACHAKOS COUNTY KCSE TRIAL & PRACTICE EXAMINATION

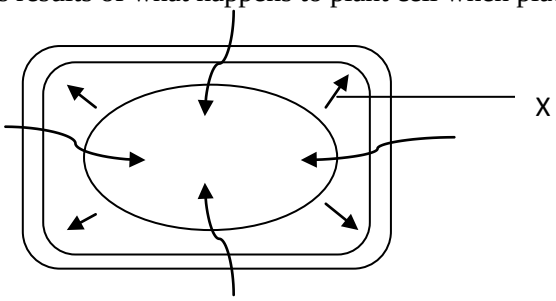
Kenya Certificate of Secondary Education

BIOLOGY

Paper 1
Time: 2 Hours

1. What do the following branches of Biology entail? (2marks) (a) Cytology
   (b) Entomology

2. State TWO characteristics of kingdom Monera that are not found in other kingdoms. (2marks)
3. Two species in an ecosystem cannot occupy the same niche. Explain. (1 mark)
4. State the significance of metamorphosis to the life of insects. (2 marks)
5. The diagram below shows results of what happens to plant cell when placed in a certain solution.



   a) What was the nature of the solution in which the cell was placed? (1 mark)
   b) Identify the force represented by the arrow X and explain how it develops. (2 marks)
6. Which organelle would be numerous in the following cells; (2 marks)
   a) Liver cell
   b) Palisade cell

7. The scientific names of three animals leopard, wolf and lion in the family carnivora are; Panthera pardus, Canis lupas and Panthera leo respectively.
   a) Why are scientific names given in Latin? (1 mark)
   b) What does *Canis* refer to? (1 mark)
   c) Giving a reason, state the organisms that are MOST closely related. (1 mark)
8. The word equation below shows a biological process.
   Water ⟶ Hydrogen atom + oxygen

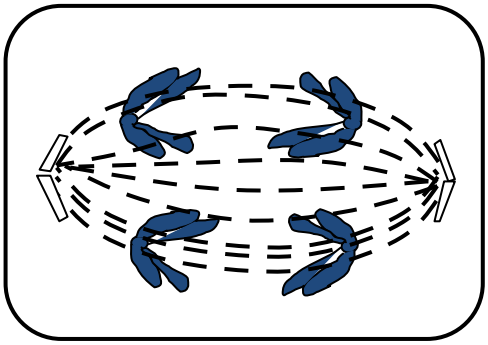
   a) Name the process. (1 mark)
   b) Where does the process named in a) above take place? (1 mark)

c) State two conditions necessary for the process to occur. (2 marks) 9. a) What is the importance of heartbeat in blood circulation? (1 mark)

b) If the nerve supply to the heart of a mammal is servered, the rhythmic heart movement will still go on and the heart

continues to beat. Explain this observation. (1 mark)

10. The ovaries of an expectant woman can be removed after the first four months of pregnancy without terminating the pregnancy. Explain. (2 marks) 11. The diagram below represents a stage during cell division.

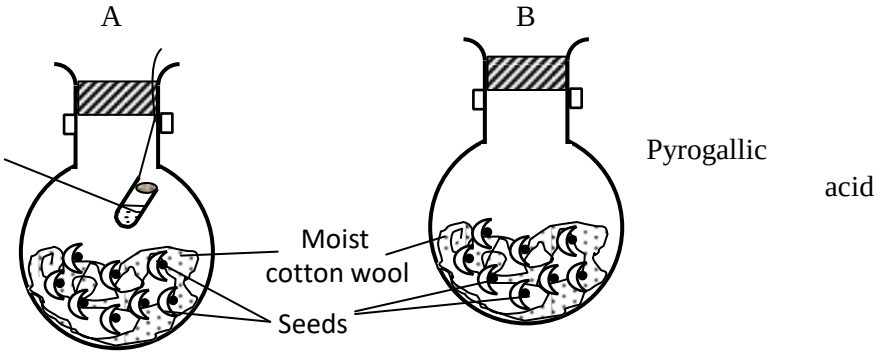


a) Name the stage of cell division. (1 mark)
b) Give two reasons for your answer in a) above. (2 marks)
c) State the significance of this stage of cell division in living organisms. (1 mark)

12.) Name the causative agent for the following diseases;

a) Typhoid (1 mark)
b) Syphilis (1 mark)

13. A student set up an experiment as shown in the diagram below. The set up was kept at room temperature for one week.



a) What was the aim of the experiment? (1 mark)
b) State the expected observation at the end of the experiment. (2 marks)
c) Account for the observation made in set up A. (1 mark)
14. a) Name the respiratory surface for gaseous exchange in insects. (1 mark)
b) State two adaptations of the site named in a) above. (2 marks)

15. A portion of a nucleic acid is shown below;

-S–P–S -P-S-P-S-P-S-P- S -

| | | | | | |

C C G U G C

a) Name the nucleic acid to which the portion belongs. Give a reason.
(2 marks)

b) Write down the sequence of bases of a complimentary strand to the one above. (1 mark)

16. Explain the meaning of the following terms;

a) Basal Metabolic Rate
(1 mark)

b) Oxygen Debt
(1 mark)

17. In an experiment, the concentration of ions in the cell sap of reeds growing in a swampy area and the water in the swamp were determined. The data below was obtained. Study it and answer the questions that follow:

Sample	Na^+	Mg^{2+}	Cl^-	SO_{42-}
Cell sap	50	11	101	13
Swamp water	1.2	30	10.2	0.67

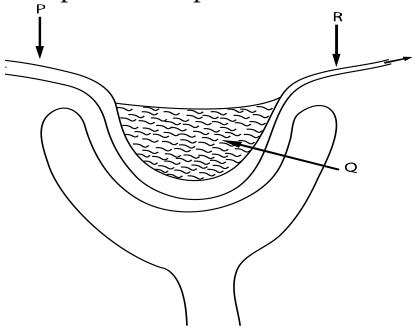
a) Name the process by which uptake of the following ions by the reeds occurs. (2 marks)

Na^+ ions .....

Mg^{2+} ions .....

b) What effect would reduced oxygen supply have on the uptake of sulphate ions? (2 marks)
Explain your answer.

18. The diagram below shows a part of a nephron.



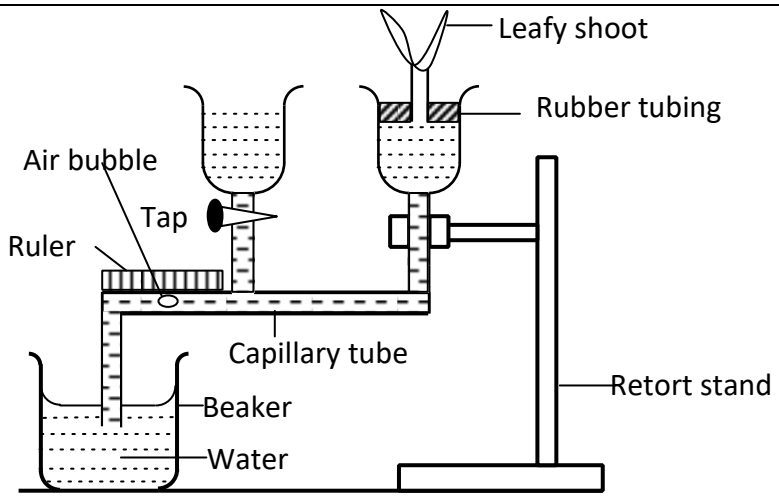
a) State TWO differences in composition of blood in parts P and R.
(2 marks)

b) State a characteristic feature of blood capillaries in part Q that is not found in other capillarities
(1 mark)

19. (a) Name two types of light sensitive cells found in the human eye. (1 mark)

(b) State ONE functional difference between the cells you have named in a) above. (1 mark)

20. A set up was used to investigate a certain process in plants as shown in the diagram below.



a) What process was being investigated? (1 mark)

b) Giving a reason, state one precaution that should be taken when setting up this experiment. (1 mark) (c) How would changes in temperature affect the rate of movement of the air bubble? (1 mark)

21. Julie observed eight onion epidermal cells across the field of view of a light microscope. If the field of view was 4mm in diameter, estimate the average size of the cells in micrometers (1mm= 1000μm). (2 marks)

22. How is support brought about in herbaceous plants? (2 marks) 23. State the functions of the following parts of the mammalian ear.

a) Eustachian tube (1mark)

b) The utriculus and sacculus (1mark)

24. In an experiment, a shoot of maize seedling was exposed to light on one side. It was observed that it grew bending towards the direction of the source of light.

a) Explain how the bending towards light occurs. (2marks)

K	L	M	N	O	P	Q

K	L	M	P	Q

b) State the survival value of the response named in a) above. (1 mark)

25. The diagram below show various types of gene mutations.

Mutation I;

S	T	U	V	W	X	Y

S	T	U	N	W	X	Y

Mutation II;

i) Identify the type of mutations shown above (2 marks)

ii) Name one disorder that results from gene mutation II. (1 mark)

26. State THREE adaptations of a leaf to gaseous exchange. (3 marks)

27. Distinguish between analogous structures and homologous structures. For each structure give an example. (4 marks)

28. The diagram below shows a bone that was obtained from a mammal.

a) Identify the bone. (1 mark)

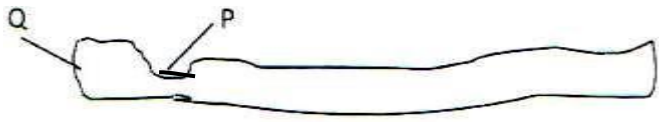
b) i) Name the type of joint formed at the part marked P. (1 mark)

ii) State one characteristic of the joint named in b) i) above. (1 mark)

29. What is the importance of the pollen tube in fertilization in plants? (1 marks)

30. a) The action of pepsin stops in the duodenum. Explain. (2 marks)

b) State two functions of the muscles found in the alimentary canal of mammals. (2 marks)



MACHAKOS COUNTY KCSE TRIAL & PRACTICE EXAMINATION

Kenya Certificate of Secondary Education

BIOLOGY

Paper 2

Time: 2 Hours

1. (a) Name the organelles that perform each of the following functions in a cell. (4 marks)

(i) Synthesis of proteins

(ii) Transport cell secretions

(iii) Destroy old and worn out organelles or even the entire cell.

(iv) Package and transport glycoproteins.

(b) Using a light microscope, a student counted 55 cells across a field of view whose diameter was 6000 m. Calculate the average length of the cells. Show your working. (3 marks)

(c) Why is it recommended to keep the stage of the microscope dry. (1 mark)

2. In a certain plant species which is normally green, a recessive gene for colour (n) causes the plant to be white when present in a homozygous state. Such plants die at early age. In heterozygous state, the plants are pale green in colour but grow to maturity.

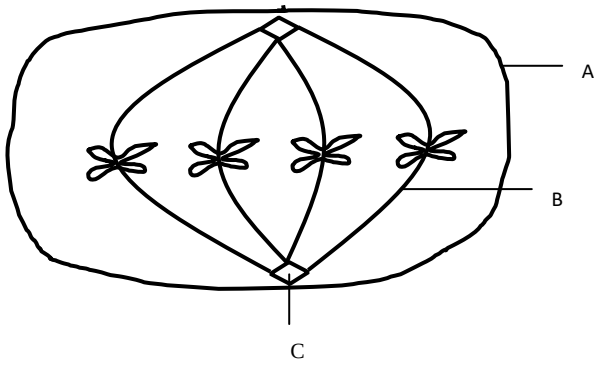
(a) Suggest a reason for the early death of plants with homozygous recessive gene. (2 marks)

(b) If a normal green plant was crossed with a pale green plant, what would be the genotype of the F1 generation? (Show your working) (3 marks)

(c) If seeds from the heterozygous plants were planted and the resulting plants allowed to self pollinate. Workout the
phenotypic ratio of the plants that would grow to maturity. (2 marks)

(d) Give an explanation for occurrence of the pale green colour in heterozygous plants. (1 mark)

3. The diagram below represents a state in cell division. Study it and answer the questions below.



(a) Name the stage of cell division illustrated in the diagram above. (1 mark)
(b) Name the parts labelled A, B and C (3 marks)
(c) State **THREE** differences between mitosis and meiosis. (3 marks)
d)Name the process during which the exchange of genetic materials occur at prophase 1 of meiosis. (1mark)
4.(a) Describe how the quadrant method can be used to estimate the population of various species of plants in a given habitat.

(3 marks)

(b) To estimate the population size of beetles in an ecosystem, traps were laid at random. 400 beetles were caught, marked and released back into the ecosystem. A week later traps were laid again and 374 beetles were caught. Out of the 374 beettles, 80 were found to have been marked.
(i) Calculate the population size of the beetles in the ecosystem. (2 marks)
(ii) State **TWO** assumptions that were made during the investigation. (2 marks)
(c) What is the name given to this method of estimating the population size? (1 mark)

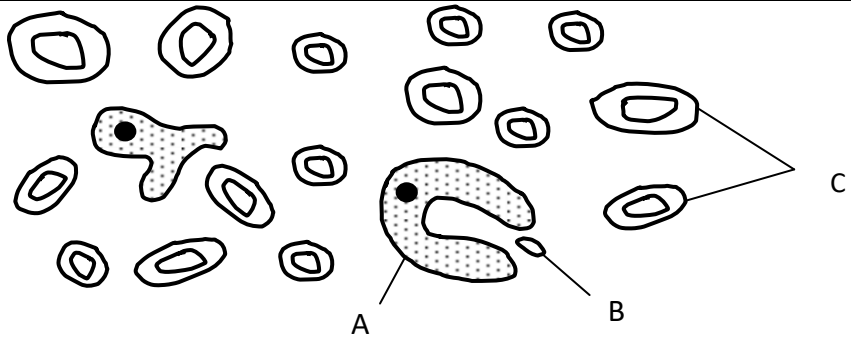
5. The table below shows the approximate distribution of blood groups in a sample of 100 people in a population.

Blood group	**Frequency**	**Rhesus +ve**	**Rhesus -ve**
A	**26**	**22**	**4**
B	**20**	**18**	**2**
AB	**4**	**3**	**1**
O	**50**	**43**	**8**

(a) Calculate the percentage of Rhesus negative (Rh-ve) individuals in the population? (1 mark) (b) Account for

(i) The large number of blood group O individuals in a population. (2 marks)
(ii) The small number of individuals with blood group AB. (2 marks)

(c) The diagram below represents a blood smear on a glass slide.



(i) State the importance of structure C being large numbers in the blood smear. (1 mark)

(ii) Give a reason why structure C would be found in large numbers in high altitude than in low altitude. (1 mark)

(iii) Name the process by which structure A would engulf structure B. (1 mark)

SECTION B: 40 (MARKS)

Answer question 6 (Compulsory) and either question 7 or 8 in the spaces provided after question 8.

6. An experiment was carried out to investigate transpiration and absorption of water in sunflower plants in their natural environment with adequate supply of water. The amount of water was determined in two hour intervals. The results are shown in the table below.

	Amount of water in grammes	
Time of day	**Transpiration**	**Absorption**
1100-1300	33	20
1300-1500	45	30
1500-1700	52	42
1700-1900	46	46
1900-2100	25	32
2100-2300	16	20
2300-0100	08	15
0100- 0300	04	11

(a) Using the same axes, plot graphs to show transpiration and absorption of water in grammes against time of the day.

(7 marks)

(b) At what time of the day was the amount of water the same for transpiration and absorption. (1 Mark)

(c) Account for the shape of the graph of

(i) Transpiration (3marks)

(ii) Absorption

(3marks)

(d) What would happen to transpiration and absorption of water if the experiment was continued till 0050 hours.(2 marks)

(e) Name two factors that may affect transpiration and absorption at any given time. (2 marks)

(f) Explain how the factors you named in (e) above affect transpiration.

(2marks)

7. Describe the

(i) Process of inhalation in mammals (10 marks)

(ii) Mechanism of opening and closing of stomata

(10 marks)

8. How is the human eye adapted to its functions (20 marks)

MACHAKOS COUNTY KCSE TRIAL AND PRACTISE EXAM
Kenya Certificate of Secondary Education (K.C.S.E)

231/3
BIOLOGY
PAPER 3
(PRACTICAL)
$1^{3}/_{4}$ HOURS

Each candidate should be provided with the following items.

- 80 ml of iodine solution.
- 8 cm visking tubing.
- 2 pieces of strong cotton thread 20 cm long.
- 100ml beaker (glass or plastic)
- Means of timing. A wall clock will be appropriate.
- 10ml measuring cylinder.
- 100ml water is 250ml beaker.
- A ruler with mm marking.
- Medium size semi-ripe tomato labelled specimen P.
- 10ml of 10% starch solution labelled X.
- Scalpel.

MACHAKOS COUNTY KCSE TRIAL & PRACTICE EXAMINATION
Kenya Certificate of Secondary Education (K.C.S.E)

231/3
BIOLOGY
PAPER 3
(PRACTICAL)
$1^{3}/_{4}$ HOURS

---

1. You are provided with specimen P. Make a longitudinal section.
   (a) (i) Draw and label one of the cut surface of the specimen. (4 Marks)
   (ii) Work out the magnification of your drawing. (1 Mark)
   (b) (i) What type of fruit is specimen P? (1 Mark)
   (ii) Give a reason for your answer. (1 Mark)
   (c) (i) Suggest the type of placentation found in specimen P. (1 Mark)
   (ii) Give one reason for your answer. (1 Mark)
   (d) (i) Name the mode of dispersal of the specimen. (1 Mark)
   (ii) State two ways in which specimen P is adapted to be dispersed by the mode named in (i) (4 marks)
2. You are provided with iodine solution, visking tubing, a beaker and a solution labelled X.

Tie one end of the tubing provided with a t1hread tightly. Measure 5ml of solution X. Pour 5ml of solution X into the visking tubing.

Tie the other end of the tubing tightly. Ensure there is no leakage. Rinse the outside of the tubing with distilled water and immerse it with its contents in a beaker containing iodine solution. Allow it to stand for 20 minutes.

(a) (i) Record your observation at the beginning and end of the experiment. Record your results in the table below.

(4 Marks)

Experimental set up	Solution x inside the tubing	Iodine solution outside the tubing
Beginning of experiment		
End of experiment		

(ii) What was the identity of solution x. (1 Mark)

(iii) Suggest the nature of visking tube. (1 Mark) (iv)

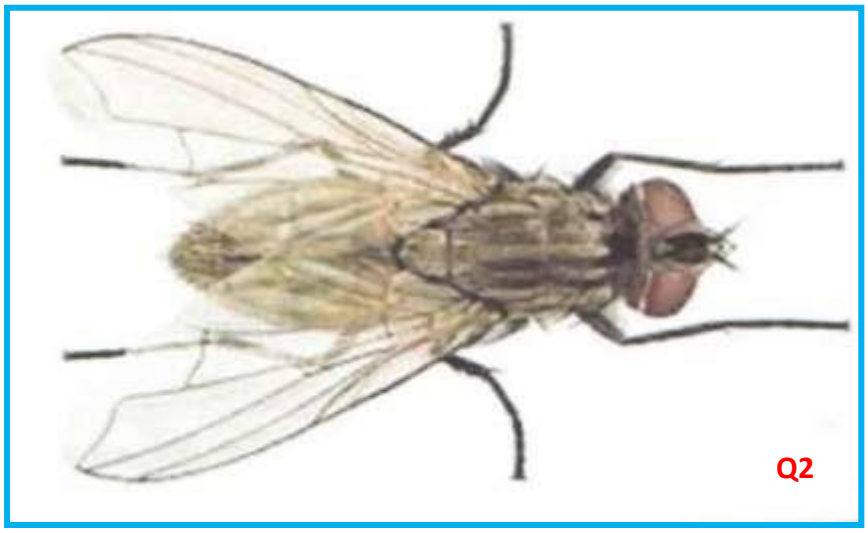
Account for the results obtained in a (i) above. (4 Marks)

b) (i) Which physiological process was being investigated in this experiment? (1 Mark)

(ii) State two factors which affects the process being investigated (2 Marks)

3. You have been provided with photographs of specimens labelled Q1, Q2 and Q3. Examine them.







a) By using observable features only, state the phylum and class to which the specimens belong. By using the three specimens, give reasons for each case.

(a) Phylum (1 Mark)
Reasons (3 marks)

(b) Class (1 mark)
Reasons (3 marks)

(c) Using observable features only, give three differences between specimen Q_1 and Q_3. (2 Marks)

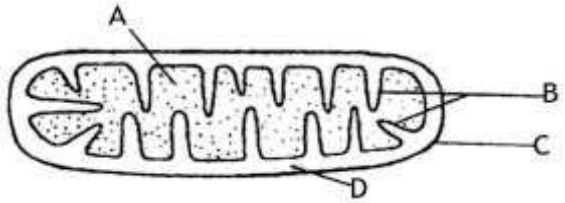
(d) (i) Apart from locomotion, state the other role of the hind limbs of specimen Q_1. (1 Mark)

(ii) How are the hind limbs of specimen Q1 adapted to perform role named in d (i) above. (2 Marks)

NANDI NORTH SUB-COUNTY JOINT PRE-MOCK EXAMINATIONS

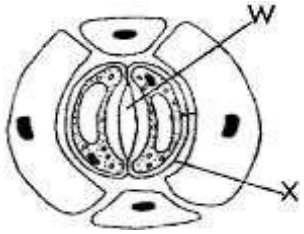
Kenya Certificate of Secondary Education (K.C.S.E.)
BIOLOGY
PAPER 1
TIME: 2 HOURS

1. Name the causative agent of cholera. (1mk)
2. The diagram below represents a cell organelle.



(i) Identify the organelle. (1mk)
(ii) Name the part labelled B. (1mk)
(iii) State the function of the part labelled A. (1mk)
(iv) Condenser (1mk)
Diaphragm (1mk)

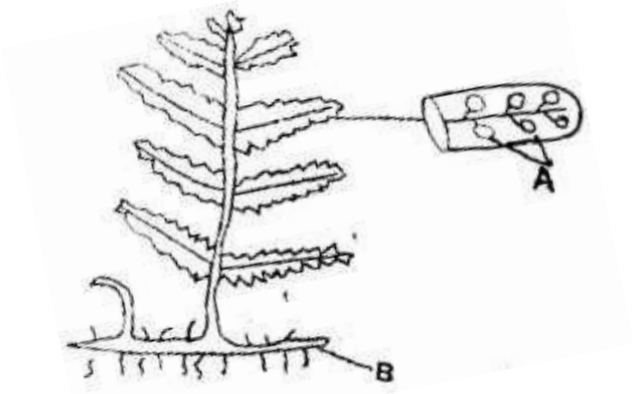
3. (a) Explain **three** ways in which a red blood cell is adapted to its functions. (3mks)
(b) In which form is carbon (IV) oxide transported? (2mks)
4. State the functions of the following organelles.
(i) Centriole (1mk)
(ii) Nucleolus (1mk)
5. The diagram **below** shows part of plant tissue.



(i) Name the cell labelled **X** and part labelled **W**. (2mks)
(ii) State **two** adaptations of cell labelled X to its functions. (2mks)
6. (a) Differentiate between hypogeal germination and epigeal germination. (2mks)
(b) State **two** internal causes of dormancy in seed. (2mks)
7. (a) Define polyploidy. (1mk)
(b) Name **three** disorders resulting from gene mutations. (3mks)
8. (a) Distinguish between homologous and analogous structure. (2mks)

(b) Explain the term continental drift as used in evolution. (2mks)

9. The diagram below represents a fern.



(a) Name parts labelled A and B. (2mks)

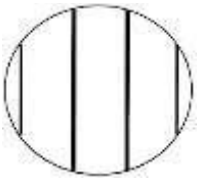
(b) In which division does the plant belong? (1mk)

(c) State the function of the part labelled A. (1mk)

10. (a) Name **three** supportive tissues in plants. (3mks)

(b) Name the type of muscles found in the gut. (1mk)

11. A form one student trying to estimate the size of onion cells observed the following on the microscope's field of view.



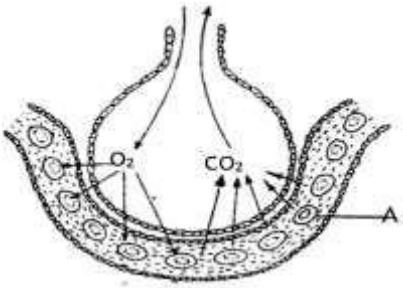
(i) Define the term resolving power. (1mk)

(ii) If the student counted 20 cells across the field of view, calculate the size of one cell in micrometers.

12. (a) Distinguish between transpiration and guttation. (2mks)

(b) State **two** importance of guttation in hydrophytes. (2mks)

13. The diagram **below** shows the exchange of gases in alveolus.

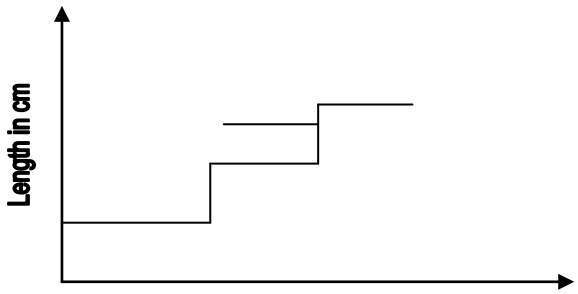


(i) State how the alveoli are adapted to their function. (3mks)

(ii) Name the cell labelled **A**. (1mk)

14. (a) Distinguish between respiratory quotient and oxygen debt. (2mks)
(b) Name the site where anaerobic respiration occurs in the cell. (1mk)

15. Study the graph below and answer the questions that follow.



(i) What is the name given to the type of graph? (1mk)
(ii) What is the name used to describe point X? (1mk)
(iii) What is the importance of part X? (1mk)
(iv) Name the phylum in which the graph represented in above occurs. (1mk)

16. (a) Define the term natural selection. (1mk) (b) State **three** evidence of organic evolution. (3mks)

17. State **one** adaptation of the following parts of mammalian eye.
(i) Fovea centralis. (1mk)
(ii) Sclera (1mk)
(iii) Cilliary body (1mk)

18. Name the strengthening substance in sclerenchyma tissue. (1mk) 19.
(a) Differentiate between gaseous exchange and ventilation. (2mks)
(b) Name the respiratory sites of the following:
(i) Fish (1mk)
(ii) Insects (1mk)

20. (a) Name **two** cardiovascular diseases. (2mks)
(b) If the nerve supply to the heart of a mammal is severed, the rhythmic heart contraction and relaxation will go on and heart continues to beat. Explain why. (2mks)

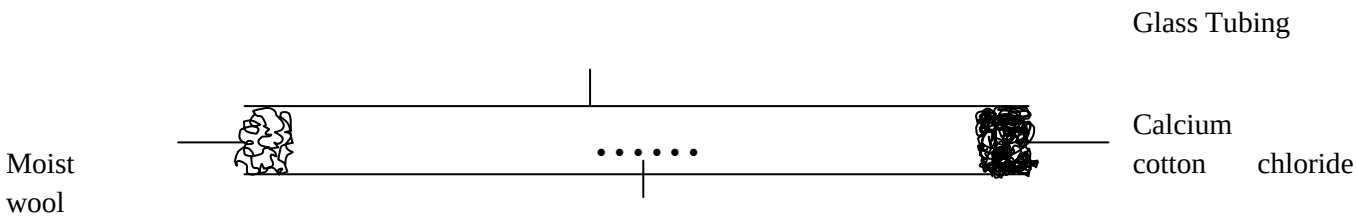
21. Name **two** major branches of Biology. (2mks)
22. State the functions of the following apparatus.
(i) Bait trap (1mk)
(ii) Pooter
23. State **two** structural adaptations of veins to their function.
24. Name the process that results to formation of tissue fluid. (1mk)
25. What is serum? (1mks)

NANDI NORTH SUB-COUNTY JOINT PRE-MOCK EXAMINATIONS

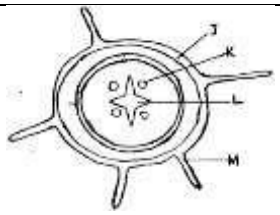
Kenya Certificate of Secondary Education (K.C.S.E.)
231/2
BIOLOGY
PAPER 2
(THEORY)
TIME: 2 HOURS

SECTION A (40 MARKS)
Answer all questions in this section in the spaces provided.

1. A climbing plant twines around the stem of a tall tree.
   (b) (i) Name the type of response exhibited by the climbing stem. (1mk)
   (ii) Explain how the response named in (a) (i) above takes place. (3mks)
   (c) An experiment was carried out to investigate the response of white termites to a certain stimulus. Ten termites were placed at the centre of glass tubing. Calcium chloride was placed on one end of the tubing and moist cotton wool at the other end as illustrated below.



   a. What observations are made after 20 minutes? (1mk)
   b. What type of response is exhibited by the termites? (1mk)
   c. What is the survival value of the above response? (1mk)
   d. What is Photonasty? (1mk)
2. (a) What is multiple allelism? (1mk)
   (b) A pure breeding black male mouse was mated with a pure breeding brown female mouse. All the offspring had black coat colour.
   i. Explain the appearance of black coat colour in the offspring. (1mk)
   ii. If the black parental mouse was mated with a mouse that is heterozygous for coat colour, work out the genotypic ratio of offspring. Show your working. (4mks) iii. State **two** disorders in human beings hat are as a result of chromosomal mutation. (2mks)
3. (a) (i) What is meant by the term biological control? (1mk)
   (ii) Give an example of biological control. (1mk)
   (b) (i) What is eutrophication? (3mks)
   (ii) What are the effects of eutrophication? (3mks)
4. The diagram below represents a transverse section of a plant organ.

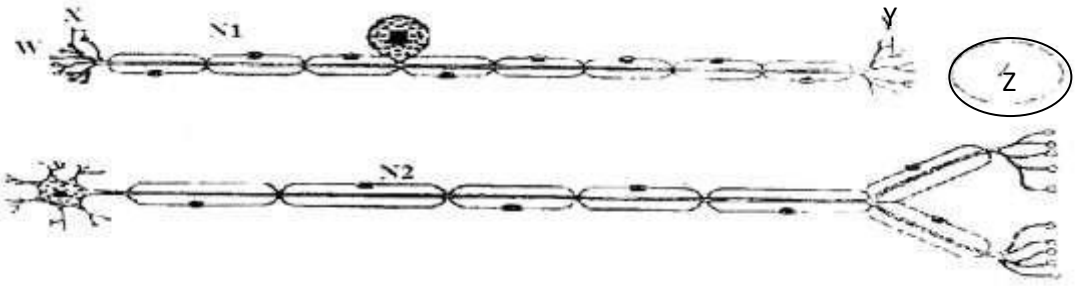


(b) From which plant organ was the section obtained?
(1mk)

(c) Give **two** reasons for your answer in (a) above. (2mks)

(d) Name the parts labeled J, K and L. (3mks)

5. The diagram below illustrate two types of neurons and associated structures. Study the diagrams carefully and answer the questions that follow.



(a) (i) Identify the type of neurons illustrated in diagrams N1 and N2. (2mks)

(ii) Provide **two** reasons for your identity of the neuron in diagram N1.
(2mks)

(c) Name each of the structures labeled X and Y in diagram N1. (2mks)

(d) Give the general name of the type of cell position Z in diagram N1.
(1mk) (d) Give the general name of the substance in position W in diagram N1.
(1mk) **SECTION B**

Answer question 6 (Compulsory) and any other one question from this section.

6. An investigation was conducted to compare rate of water loss from twigs of two different species of plants Q and L. The twigs had equal leaf surfaces. The results of the investigation were recorded in the table below.

Time of the day	6a.m	8a.m	10am	1p.m	12pm	1pm	2pm	3pm	6pm	8pm	12am
Water loss gh species Q	0	4	20	40	55	36	26	20	2	0	0
Water loss gh species L	8	20	39	131	198	182	130	81	45	12	12

(a) On the graph paper provided, plot a graph of Water loss gh^{-h} against time for the two plants. (7mks)

(i) At what time of the day was 60gh-1 of water lost by plant species L?
(1mk)

(b) Name the apparatus which might have been used to investigate the rate of water loss.
(1mk)

(c) State **two** precautions that were taken in setting up the experiment.
(2mks)

(d) Which of the plant species is likely to be adapted to arid conditions? Give a reason.
(2mks)

(e) Suggest how the stomata of species Q are structurally adapted to water loss.
(2mks)

7. Describe how the mammalian male reproductive system is adapted to perform its functions.
(20mks)

8. Describe the structure and functions of various organelles in a mature animal cell. (20mks)

NANDI NORTH SUB-COUNTY JOINT EVALUATION
231/3 – BIOLOGY PAPER 3

CONFIDENTIAL

Provide each candidate with:- Solution L (Milk)

- Filter Paper
- Funnel
- 100ml Beaker
- 2 Test Tubes
- Bench solutions
- Iodine solution
- Copper (II) Sulphate
- Sodium Hydroxide

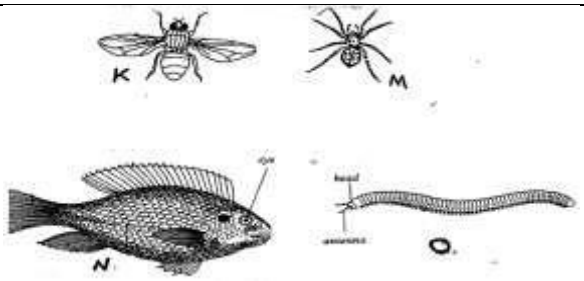
NANDI NORTH SUB-COUNTY JOINT PRE-MOCK EXAMINATIONS
Kenya Certificate of Secondary Education (K.C.S.E.)
BIOLOGY
PAPER 3
(PRACTICAL)
TIME: 1¾ HOURS

SECTION A (40 MARKS)
Answer all questions in this section in the spaces provided.

1. You are provided with a food sample labelled D in solution form. Using the reagents provided, carry out tests to identify the food substances in the food sample. (12mks)

FOOD SUBSTANCE	PROCEDURE	OBSERVATION	CONCLUSION
Proteins			
Non-Reducing Sugar			
Starch			

2. You are provided with the specimen labelled E. Examine it carefully and answer the questions that follow.
   (i) Name the class of the plant from which the specimen E was obtained. (1mk)
   (ii) Using observable features only, name **three** reasons for your answer in (i) above. (3mks)
   (iii) Name the agent of pollination for the flowers of specimen E. (1mk)
   (iv) State **four** observations on the specimen E that support the answer in (iii) above. (4mks)
   (v) Draw and label the pistil of specimen E. (4mks)
3. The photographs below represent different types of animals. Study them carefully and answer the questions that follow.



(b) State **two** observable differences between K and M. (2mks)
(c) Classify specimen M into the following taxa giving reasons for each case.
(i) Phylum (1mk)
Reasons (3mks)

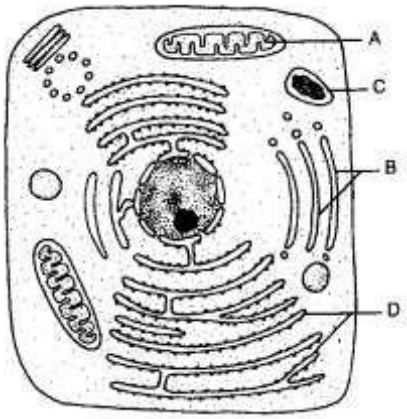
(ii) Class (1mk)
(iii) Reasons (3mks)
(d) Name the type of skeleton found in the specimen O. (1mk)
(e) (i) Name the class to which the specimen N belongs. (1mk)
(ii) Give **three** reasons for your answer in (d) (i) above. (3mks)

MOKASA JOINT EXAMINATION
(Kenya Certificate of Secondary Education)
BIOLOGY THEORY
231/1
BIOLOGY THEORY

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1. State **two** characteristics of living organisms that are specific to plants.
(2marks) 2. State **one** use for each of the following apparatus in the study of living organisms.

a) Pooter.
(1mark)
b) Bait trap. (1mark) 3. a)
Name **two** tissues in plants which are thickened with lignin. (2marks)
b) How is support attained in herbaceous plants?
(1mark) 4. The diagram below represents a cell as seen under an electron microscope.



a) Identify the parts labeled **A** and **D**. (2marks)
b) State the function of the structures found on the part labeled **D**.
(1marks)
5. a) Using a microscope, a student counted 55 cells across a field of view whose diameter was 6000µm. Calculate the average length of the cells. **Show your working**.
(2marks) b) State the function of the following parts of a light microscope

i) Fine adjustment knob. (1mark)

ii) Condenser (1mark)

6. (a) Name the fluid that is produced by sebaceous glands. (1mark)

(b) What is the role of sweat on the human skin? (2marks)

7. What is the importance of the following in an ecosystem? (2marks)
a) Decomposers
b) Predation
8. (a) State **two** functions of bile juice in the digestion of food. (2marks)
b) How does substrate concentration affect the rate of enzyme action? (1mark)

9. Name the features that increase the surface area of small intestines. (2marks) 10. Describe what happens during the light stage of photosynthesis. (3marks)

11. (a) Define the following terms. (2marks)

i. Population

ii. Community

(b) Name a method that could be used to estimate the population size of the following organisms.

i. Fish in a pond. (1mark)

ii. Black jack in a garden. (1mark)

12. (a) What is meant by the term allele? (1mark)

(b) Explain how the following occur during gene mutation.

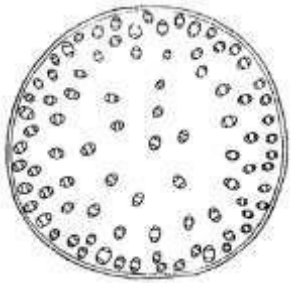
(i) Deletion. (1mark)

(ii) Inversion. (1mark)

(c) What is a test-cross? (1mark)

13. Explain what happens when there is oxygen debt in human muscles. (2marks)

14. The diagram below shows a transverse section of a plant organ.



a) Name the class to which the plant organ was obtained. (1mark)

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

15. Giving a reason in each case, name the class to which each of the following organisms belong: (4marks) Pea plant

Reason

Bat

Reason

16. (a) Name the causative agents of the following diseases in humans. (2marks)

Typhoid

Amoebic dysentery

(b) Name the disease in humans caused by *Plasmodium falciparum*. (1mark)

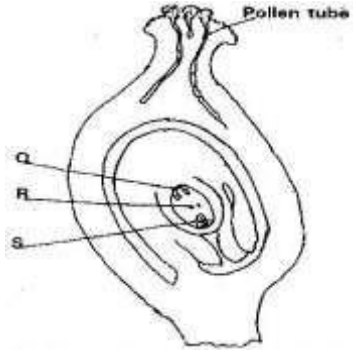
17. State **three** differences between Chilopoda and Diplopoda.
(3marks) 18. What are the limitations of fossil records as evidence of organic evolution?
(1mark)

19. The diagram below represents a member of the kingdom Animalia.

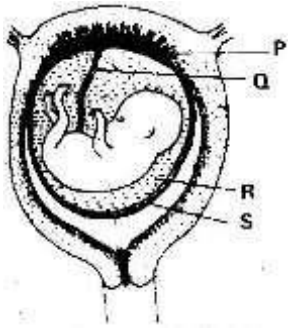


i) Name the phylum to which the organism belongs.
(1mark) ii) Using observable features in the diagram, give three reasons for the answer in (i) above.
(3marks)

20. The diagram below shows a stage during fertilization in plants.



a) Name the parts labeled **Q** and **R**.
(2marks)
b) State the function of the pollen tube.
(1mark)
c) On the diagram, label the micropyle.
(1mark) 21. The diagram below represents a human foetus in a uterus.



a) Name the types of blood vessels found in the structure labeled **Q**. (2marks)
b) Name **two** features that enable the structure labeled **P** carry out its function. (2marks)

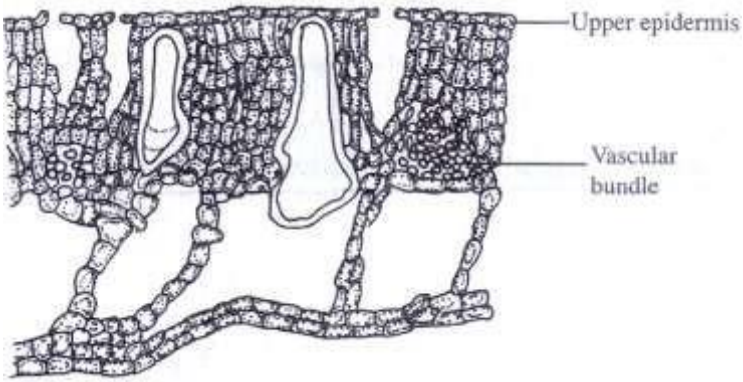
22. Name the type of skeleton that makes up each of the following animals. (3marks) a) Cockroach
b) Bird
c) Earthworm

23. (a) Highlight **two** survival values of tropic response. (2marks)
b) What is a klinostat?
(1mark)

24. Name:-
a) The pressure sensitive swellings at the base of some leaves and petals which through loss or gain of turgidity bring about nastic movements. (1mark) b) The structure in cockroach used for detecting stimuli. (1mark)

c) The growth movement of part of plants in response to a unidirectional external stimulus. (1mark)

25. The diagram below shows a transverse section of a leaf. Study it carefully then answer the questions that follow.



a) Name the habitat of the plant from which the leaf was obtained.
(1mark)

b) Give t**wo** reasons for your answer in (a) above. (2marks)

26. a) Name the gaseous exchange surface in insects. (1mark)

b) How is the surface named in (a) above suited to its function.
(2marks)

27. 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.
(2marks)

MOKASA JOINT EVALUATION EXAMINATION
Kenya Certificate of Secondary Education
231/2
BIOLOGY
Paper 2
(Theory)
2 Hours

SECTION A:

1. a) Define the following terms
   (i) Stimulus (1 mark)
   (ii) Taxis (1 mark)
   b) A student uprooted a seedling of Bryophylum and left it to lie on the ground. After a few days seedling has assumed a growth curvature shown in the diagram below.



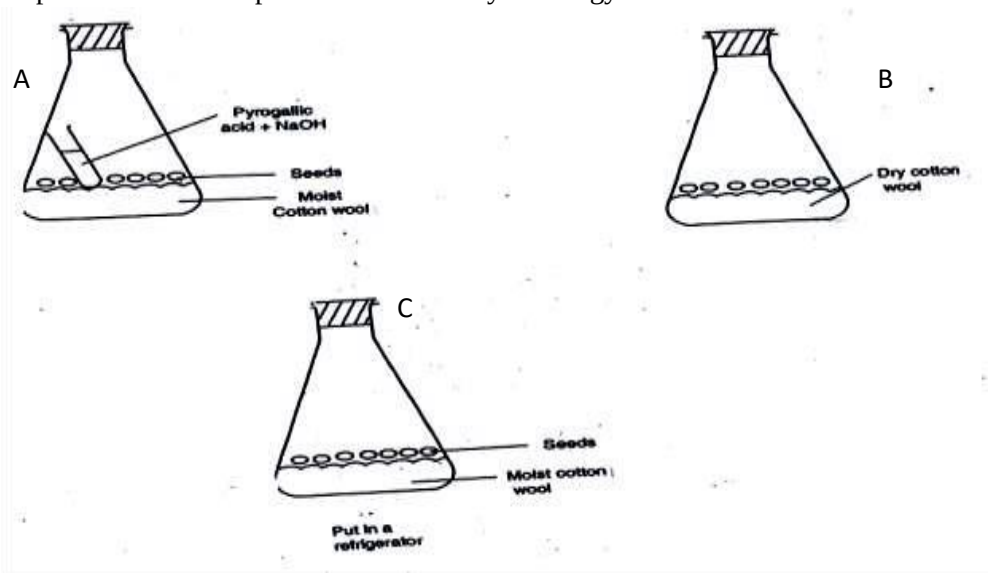
At the start of the experiment At the end of the experiment

Account for the growth curvature observed in parts (4 marks)
A and B
Part A
Part B

c) State **two** survival values of taxis to organisms (2 marks)

2. A cross between a black bull and a white cow produces a calf with black and white spots.
   a) Work out the possible genotypes of a calf resulting from a cross between a black bull and a white cow. (4 marks)
   b) State the reason why the calf had black and white spots (1 mark)
   c) What is meant by the term allele? (1 mark)
   d) State **two** characteristics of an individual with Down's syndrome (2 marks)

3. An experiment was set up as shown below by a biology class.



a) What is the role of pyrogallic acid in sodium hydroxide in flask A? (1 mark)
b) What conditions were being investigated in flasks A, B and C? (3 marks)

c) Suppose the dry cotton wool in flask B was replaced with a moist cotton and set-up left for fivend account days, give a (2 marks)
for the observation made

d) State the inhibitory roles of gibberelic acid in plants (2 marks)

4. a) Distinguish the following terms as used in animal nutrition

(i) Dentition and dental formula (1 mark)

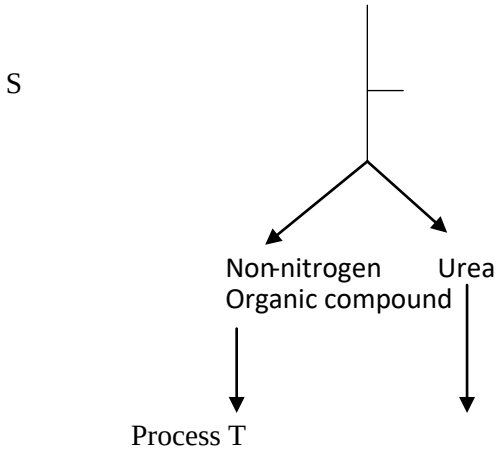
(ii) Homodont and heterodont dentition (1 mark)

b) State **two** functions of the ileum (2 marks)

c) Explain how the chloroplast is adapted to its function (4 marks)

5. Proteins are present in a balanced diet. They are broken down into amino acids and excess cannot be stored in the body. Its metabolism is as shown below.

Excess amino acids



Carbon(IV) oxide + Removal from the body

a) Describe how urea is transported to the site of removal from the body (2 marks)

b) Name the process Sand T, stating the organ in which each occurs (4 marks)

Process	Name	Organ
S		
T		

c) Give **four** uses of amino acids in the body (2 marks)

SECTION B

*Answer question **6** (**Compulsory**) in the spaces provided and either question 7 or 8 in the spaces provided after question 8.*

6. In an experiment, Tradescantia plants with purple leaves were kept in the dark for about 1 hour, strips of leaves approximately 5mm by 12mm from this plants were then cut and floated with lower epidermis on experimental solution in petri dishes. The dishes were then placed in light and temperature kept at 20°C. After 5 minutes a leaf strip was removed from each experimental solution, quickly blotted dry and the percentage number of open stomata was found after counting under the microscope. The procedure was repeated with other strips from the same experimental solutions at intervals of 10 minutes. The results are as shown in the table below.

Time in minute, floating on solution	5	15	25	35	45	55
% open stomata in KCl solution (150mm)	0	0	20	76	82	86
% open stomata in NaCl solution (150mm)	0	0	6	22	42	45

a) Plot graphs using the same axis and suitable scale for the percentage of open stomata against time for treatment in each of
the solutions, potassium chloride and sodium chloride. (7 marks)

b) Why was it necessary to keep the plant in the dark for a period of time before the experiment? (1 mark)

c) Using the graphs you have plotted give possible explanations for the behaviour of the guard cells during this experiment

(6 marks)

d) What would happen if the experiment was carried out in the dark (1 mark)

e) With respect to leaf structure only, state **five** ways in which plants living in arid areas minimize excessive water loss.

(5 marks)

7. a) State **four** precautions to be observed when collecting specimens. (4 marks)
b) Explain how the various activities of man have caused soil pollution (16 marks)

8. a) State the various ways in which energy is utilized in living organisms
(6 marks)

b) Describe the process of fertilization and implantation of the zygote in mammals (14 mks)

MOKASA JOINT EXAMINATION

Kenya Certificate ***of Secondary Education***
231/3
BIOLOGY
Paper 3
(Practical)
CONFIDENTIAL FOR EXAM REQUIREMENT

The teacher in-charge of Biology to provide the following specimens and apparatus to each candidate.

1. A piece of Lung (about 20 cm^3) obtained from a mammal like a cow or goat labeled specimen T.
Provide specimen T on a Petri-dish or on a flat surface.

2. A gill obtained from a bony fish like Tilapia labeled specimen R.
3. Partially unripe pawpaw (small size) labeled specimen K.
4. Means of cutting e.g. sharp Knife/sharp scalpel/surgical blade.
5. Tap water labeled solution X. (Provide 100 ml for each candidate)
6. Concentrated salt solution labeled solution Y. (Provide 100ml per candidate)
7. A transparent ruler.
8. A pair of forceps.

MOKASA JOINT EXAMINATION
Kenya Certificate **of Secondary Education**

231/3
BIOLOGY
Paper 3
(Practical)
1 3/4 Hours

1. You are provided with two specimens labeled T and R. Study each of the specimens carefully and use them to give accurate responses to the questions and procedures below.

(a) Take the whole of specimen T. Softly press it downwards on the petri-dish using your first finger, and then remove your finger. Observe and record what happens to the specimen.
(i) Observation (2 marks) (ii) Explain the observation recorded in (a) (i) above. (2 marks)

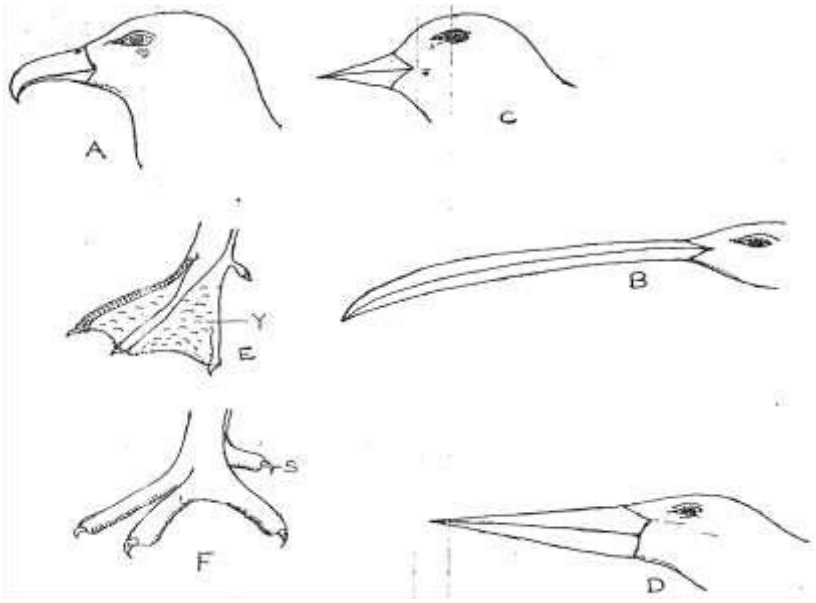
(b) (i) Specimens T and R perform some functions in the organisms from which they were removed from. State one function which is common to both specimen T and R. (1 mark)

(ii) Using observable features only on specimen R, describe how it is adapted to the function named in (b) (i) above.
(3 marks)

(c) Explain the main features that adapts specimen T to the function named in (b) (i) above. (4 marks)

(d) Identify the group of organisms that use specimen R.
(1 mark)

2. The picture below shows series of beaks in birds.



(a) State the type of evolution that may have led to the emergence of the different beaks shown on the pictures above.(1 mark)

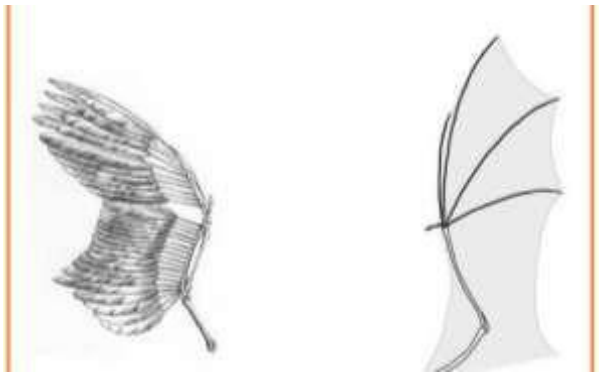
(b) Name the type of evolution structure represented by the beaks shown on the pictures above. (1 mark)

(c) Observe the pictures carefully. From your observations, what features are responsible for the different types of beaks?
(3 marks)

(d) Suggest the type of food likely eaten by birds whose beaks are shown in pictures A, B, C and D. (4 marks)

(e) Briefly state how beak shown in picture A is adapted to feeding. (1 mark)

(f) Below are pictures from two different organisms.



(i) What is the specific function of the two structures shown in the pictures? (1 mark)
(ii) What type of structures is represented by the two structures shown on the pictures? (1 mark)

3. You are provided with a specimen labeled K.

(a) (i) With a reason, identify the part of the plant represented by the specimen. (2 marks)
(ii) Cut the specimen into two halves transversely. Observe the arrangement of seeds inside the specimen. Suggest its placentation. (1 mark)

(b) (i) Suggest the mode of dispersal for specimen K. (1 mark)
(ii) Give one reason for your answer in (b) (i) above. (1 mark)

(c) (i) Specimen K in its raw state has an excretory substance in its skin. Name the excretory substances. (1 mark)
(ii) How is the excretory substance named in (c) (i) importance to human? (2 mark)

(d) From the remaining parts of specimen K, cut out thin strips measuring 1cm wide and 5cm long. Place two of the stripes in tap water (solution X) and the other 2 in concentrated salt solution (solution Y). Allow the set ups to stand for 30 minutes. (i) After the 30 minutes, remove the stripes from the two solutions. Observe and record the shape of the strips from each solution. (2 marks)

Solution X

Solution Y

(ii) Using your fingers, feel the texture of the strips from the two solutions. (2 marks) Texture
Solution X

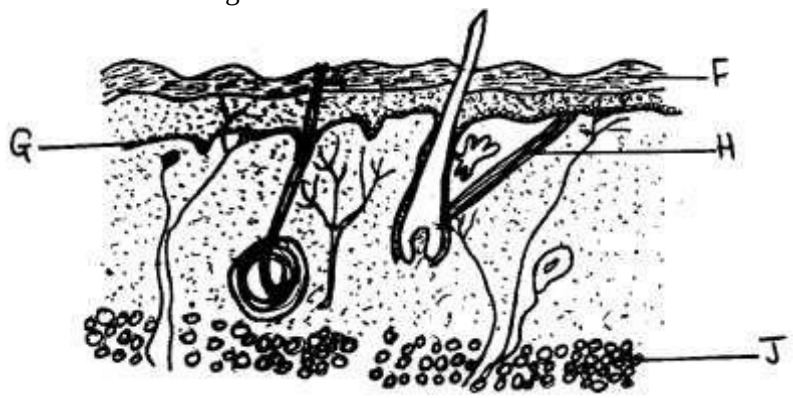
Solution Y

(e) Explain the observations made in (d) (i) and (ii) for stripes in solution X. (3 marks)

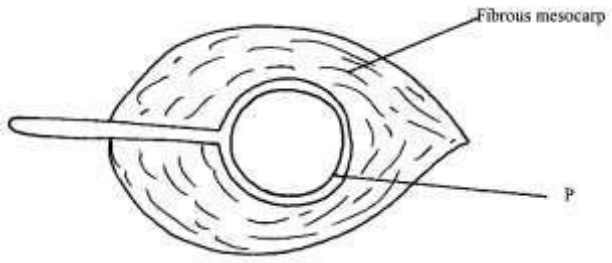
SUNSHINE
PRE-MOCK 1

BIOLOGY
PAPER 1
(THEORY)
TIME: 2 HOURS

1. (a) Define the term _parthenocarpy‘.
(1mk)
(b) Name **two** plant growth hormones that promote parthenocarpy.
(2mks)
2. Name the organelle that performs each of the following functions in a cell
(i) Protein synthesis. (1mk)
(ii) Transport of cell secretions. (1mk)
3. The diagram below shows a longitudinal section of mammalian skin.



a) Name the parts labelled **F** and **G.** (2mrks)
b) State **one** function of each of the parts labelled **H** and **J**
(2mrks)
4. Other than carbon (IV) oxide, name other products of anaerobic respiration in plants
(2mks)
5. (a) Name the fluid that is produced by sebaceous glands. (1mk)
(b) State **two** functions of sweat on the human body.
(2mks)
6. (a) State **two** characteristics that are used to divide the phylum arthropoda into classes.
(2mks)
(b) Name the class with the largest number of individuals in the phylum Arthropoda.
(1mk)
7. Why are people with blood group O referred to as universal donors? (1mk)
8. The diagram below represents a longitudinal section of a fruit



(a) Name structures labeled P (1mk)
(b) Describe two adaptations of the fruit for its mode of dispersal
(3mks) (i) Mode of dispersal (ii) Adaptation
9. (a) What causes the following diseases?
(i) Diabetes mellitus. (1mk)
(ii) Diabetes insipidus. (1mk)

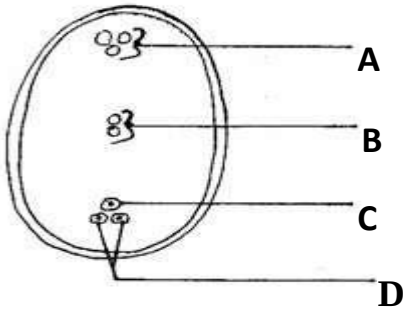
(b) An individual shows the symptoms for diabetes mellitus, how would you determine in the school laboratory whether they are positive for the condition?
(3mks)

10. In an attempt to estimate the number of weaver birds in a small woodland 435 were captured, marked and released. Three days later, 620 were captured 75 of which were marked.
    a) What is the name of the sampling method described above?
    (1mk)
    b) Calculate the approximate size of the weaver bird population in the woodland.
    (2mks)
    c) Give one disadvantage of this method.
    (1mk)
11. Identify the nucleic acid whose base sequence is shown below.
    G-A-C-U-A-G-A-C-G

    i) Identify the type of nucleic shown above
    (1mk) ii) Give reason for your answer in (i) above.
    (1mk)

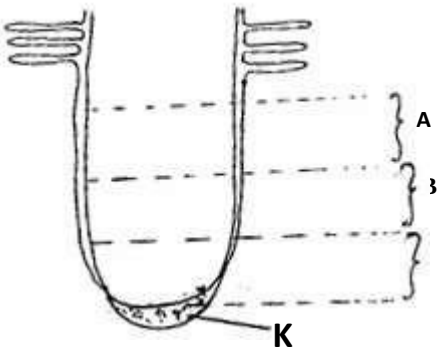
iii) Write the base sequence of a DNA strand for the nucleic acid shown above (1mk)

12. The diagram **below** shows a mature embryo sac of a flowering plant.



(a) Name the parts labeled **A** and **B** (2mks)
(b) What is the function of the structure labeled B? (1mk)
13. (a) Name the tissues that transport water in plants. (1mk)
    (b) State why the tissue above is said to be dead.
    (1mk)
14. The diagram **below** shows regions of growth in a root. Study it and answer the questions that follow.

C



(a) Name the zone labeled **B** (1mk)

(b) State the function of part **K**
(1mk)

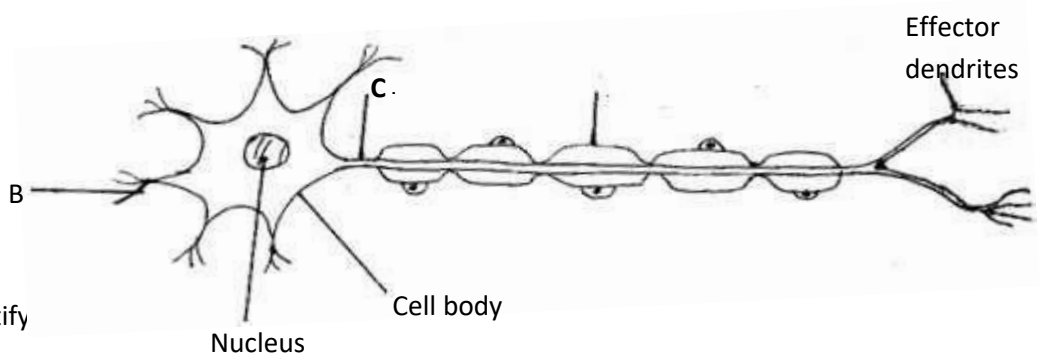
(c) State three characteristics of the cells found in zone **C** (3 mks)

15. The enzymes pepsin and trypsin are secreted in their inactive forms. Explain why they are secreted in these inactive forms.

(1mk)

16. (a) Give two examples of natural selection in action.
(2mk)

(b) List three features that make man the most dominant species on earth.
(3mks) 17. Study the diagram **below** of a neurone in human being.

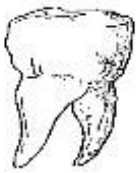


(a) Identify (1mark)

(b) Name the parts labeled. A and B
(2marks)

(c) Using an arrow indicate the direction of movement of a nerve impulse along the neuron
(1mark)

18. Study the diagram of the mammalian tooth **below** and answer the questions that follow.



(a) Identify the tooth. (1mk)

(b) Give a reason for your answer in (a) above. (1mk) (c) State **one** adaptation of the tooth to its function.
(1mk)

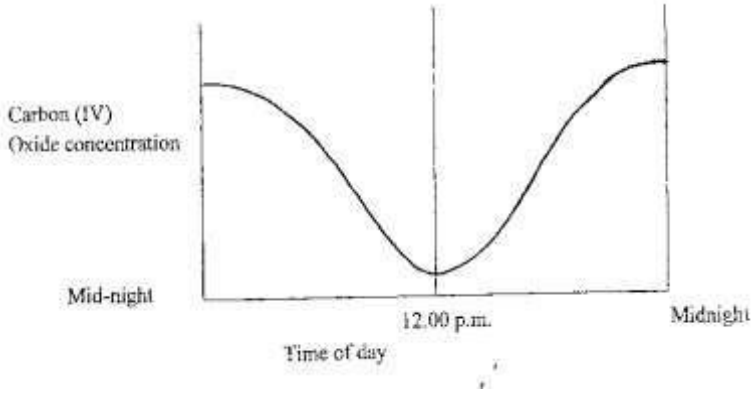
19. a) Name the part of the brain that regulates breathing
(1mk)

b) Give two ways through which the body responds to increased concentration of carbon (IV) oxide in the blood

(2mks)

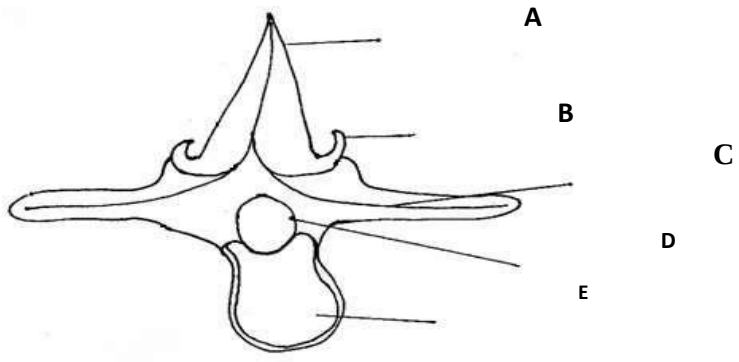
c) Name the structures in pneumatophores through which gaseous exchange occurs.
(1mk)

20. The concentration of carbon (IV) oxide in a tropical forest was measured during the course of 24 hours period from mid-night to mid-night.



Account for the results obtained at mid day. (2mks)

21. The diagram **below** represents the anterior view of a certain vertebra.



(a) With a reason, identify the type of vertebra shown **above**. (2mks)

(b) Name the parts labeled.

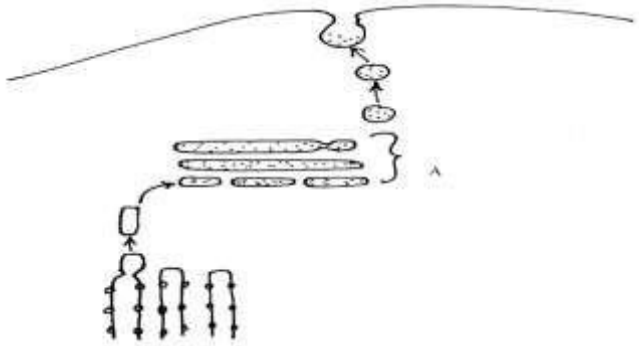
(i) **A** (1mk)

(ii) **D** (1mk)

(c) State the function of part **E**. (1mk)

22. (a) State one similarity between diffusion and osmosis (1mk) (b) State two factors that can reduce the rate of active transport (2mks)

23. Study the diagram below and use it to answer the questions.



(a) Identify the organelle marked A. (1mk)

(b) Give three functions of the organelle named in (a) above (3mks)

24. It was found that during germination of pea seeds 9.3cm^3 of carbon (iv) oxide was produced while 9.1cm^3 of oxygen was used up.

(a) Calculate the respiratory quotient (RQ) of the reaction taking place.
(2mks)

(b) Identify the type of food substance being metabolized.
(1mk)

25. What is the biological importance of the larval stage during metamorphosis
(2mks)

SUNSHINE
231/2
BIOLOGY PAPER 2
(THEORY)
TIME: 2 HOURS

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1. In human beings, a **downward pointed frontal hairline** (—windows peak‖) is a heritable trait. A person with windows peak always has at least one parent who has this trait; where as persons with **frontal hairline** may occur in families in which one or even both parents have windows peak. Using **W** and **w** to symbolize genes for this trait

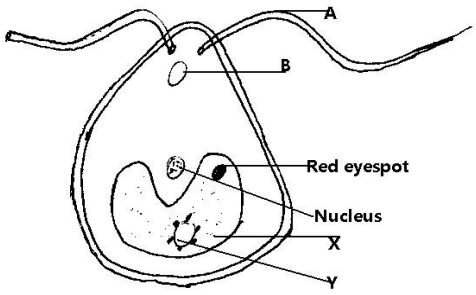
(a) Determine the F1 generation if a homozygous windows peak male parent is married to a homozygous frontal hairlined
female parent (4mks)

(b) State two causes of variations
(1mk)

(c) Name two sex linked genetic disorders affecting human females and males
(2mks)

(d) What is genome

2. The diagram below shows an organism obtained from an aquatic ecosystem



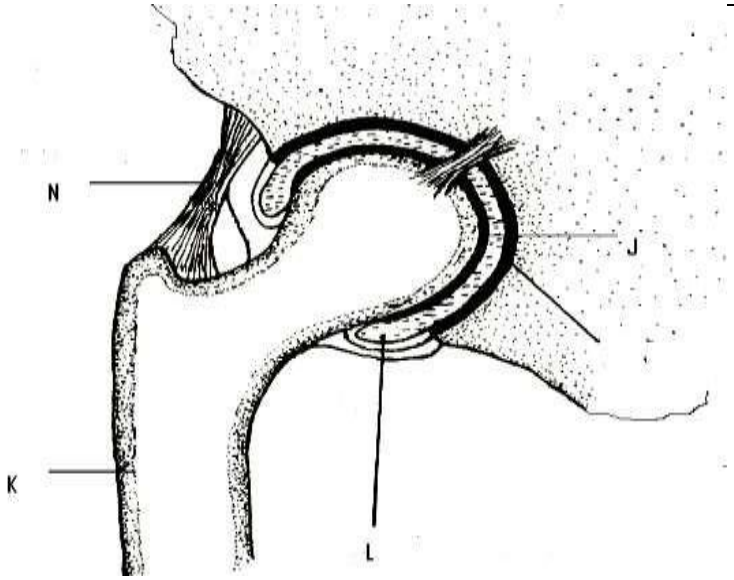
(a) **State** the kingdom in which the organism belongs.
(1mk)

(b) **Name** the parts labeled B and Y
(1mk)

(c) **State** the functions of the following parts A , X and Z (3 mk)

(d) Explain briefly why the organism is described as eukaryotic
(2mk)

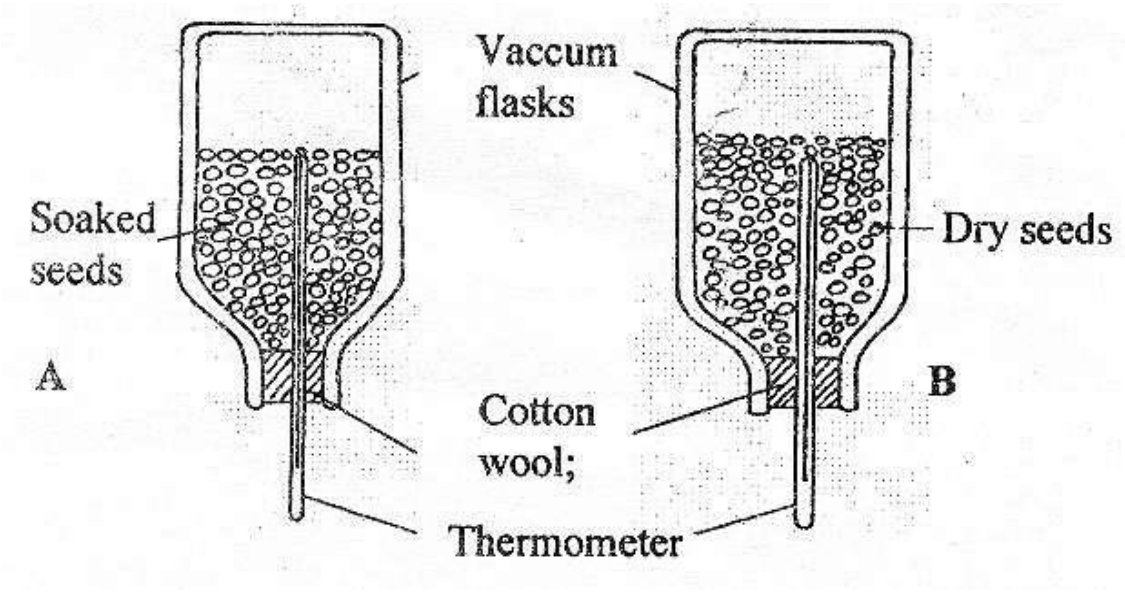
3. a) The diagram below shows some of the features of a synovial joint. Study the diagram carefully and answer the questions that follow.



(a) Name the type of synovial joint. (1 mark)
(b) Name the parts labeled J, and L (2 marks)
(c) State **two** roles of the part labeled L. (2 marks)
(d) Suggest **one** advantage of this type of joint. (1 mark)
(b) State how the following tissues are adapted to provide mechanical support in plants (2mks)

i) Parenchyma
ii) Collenchyma

4. A student set up an experiment using soaked and dry seeds as shown below

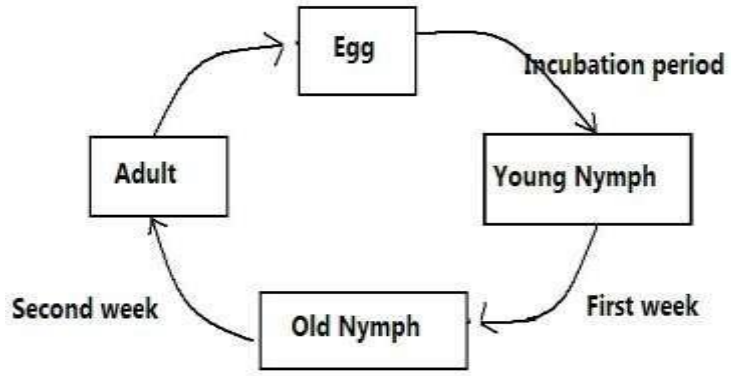


a) State the objective of this experiment (1mk)
b) State the observations made in each of the flask after 24 hours (2mks)
c) Account for the observation made in (b) above (2mks)
d) Suggest why vacuum flasks were used in this experiment (1mk)
e) What alteration would you make in the set-up to make the results more reliable (1mk)

f) Why should the seeds be washed with antiseptic/10% formalin? (1mk)

5 a) Explain how the following meristematic tissues contribute to growth of higher plants

i) Vascular cambium (2mks) ii) Cork Cambium (2mks) b) The diagram below shows a life cycle of a cockroach



a) Name the hormone that would be at high concentration during.

(i) First week (1mk)

(ii) Second week (1mk)

b) Name the structure that produces hormone in a (ii) above (1mk)

c) Name the series of stages through which the nymph undergoes to reach adult stage (1mks)

SECTION B (40 Marks)

Answer question 6 (Compulsory) and either question 7 or 8 in the spaces provided.

6. The menstrual cycle is a sequence of events repeated monthly in the female production system. The table below shows the concentration of oestrogen and progesterone hormones and body temperatures of female against time.

Time in days	Oestrogen mg/100cm of blood	Progesterone mg/100cm^3 of blood	Temperature in 0^oc
1	20	0	36.4
2	20.5	0	36.6
3	25	0	36.7
4	27.5	0	36.8
5	30	0	36.7
6	32.5	0	36.6
7	35	0	36.8
8	40	0	36.7
9	48	0	36.6
10	56	0	36.8
11	64	0	36.7
12	72	0	36.6
13	80	0	36.4
14	170	20	36.3
15	140	50	36.6
16	80	80	37.0
17	70	130	37.2
18	65	170	37.0
19	60	160	37.1
20	65	150	37.15
21	130	130	37.2

22	140	110	37.1
23	130	90	37.0
24	100	70	37.1
25	80	50	37.2
26	60	20	37.0
27	20	0	36.4

a) Using the same axis draw graphs of oestrogen and progesterone against time/days (8marks)
b) State the possible event taking place in the uterus during the first week? (1 mark)
c) State the events taking place in the ovary between day 1 and day 13. (2 marks)
d) Account for the sudden increase in the progesterone concentration between day 14 and day18. (2 marks)
e) Account for the change in temperature between day 14 and 17. (1 mark)
f) Account for the change of the curve of progesterone between day 19 and 27. (2marks) a)
State the function of the following.
(i) Ovary (1mark)
(ii) Progesterone (1 mark)
(iii) Oestrogen (1 mark)

7 a) Describe how the following evidences support the theory of organic evolution: geographical distribution, fossil records and comparative anatomy
(10mks)
b) Explain tropic responses in plants and their survival values
(10mks)

8 a) Describe the structural adaptations of mammalian heart to its Functions (10mks)
b) Explain the role of osmosis in organisms (10mks)

SUNSHINE
BIOLOGY CONFIDENTIAL
Each candidate will require the following:

- 50ml distilled water labelled Q1.
- One ripe tomato labelled specimen J.
- 2 pieces of sewing machine cotton thread 9 15cm long each)
- Benedict‘s solution
- One mature pod from leguminous plant labelled specimen K.
- Iodine solution,
- One mature (dry) fruit of Bidens pilosa (Black jack) □ Labelled specimen L.
- 10cm long piece of visking tubing (wet) and preferably of 3cm width.
- 100 ml solution (made of 2% starch and 20% glucose) labelled Q2.
- Means of heating /Flame (candle or Bunsen burner)
- 100ml beaker
- A measuring cylinder – upto 10ml □ Distilled water.
- 6 test tubes
- Tap water / water in a wash bottle
- Test tube rank □ Test tube holder

A sharp razor blade / scalped

_Note‘

Guide lines for the preparation of solution Q2

To prepare 1 litre of solution Q2, dissolve 20g starch in about 500ml distilled water, dissolve 200g glucose in the solution. Make up the total volume of the mixture 1 litre by adding distilled water.

SUNSHINE
231/3
BIOLOGY
PAPER 3
(PRACTICAL)
TIME: $1^{3}/_{4}$ HOURS

1. You are provided with liquids labelled **Q1** and **Q2.** Spare about 10ml of the liquids for part (a) of this question. Using a piece of thread, tie tightly one end of the visking (dialysis) tubing. Open the other end of the tubing and half fill it with liquid **Q1**. Tightly tie this end. **Ensure there is no leakage in both ends**. Immerse the tubing in a beaker containing liquid **Q2**. Leave the set up for at least 30 minutes.

   a) Using iodine and Benedict's solution provided; test for the food substance in liquids **Q1** and **Q2**. Record the procedure, observation and conclusion in the table below. (6mks)

LIQUID	**PROCEDURE**	**OBSERVATION**	**CONCLUSION**
A			
B			

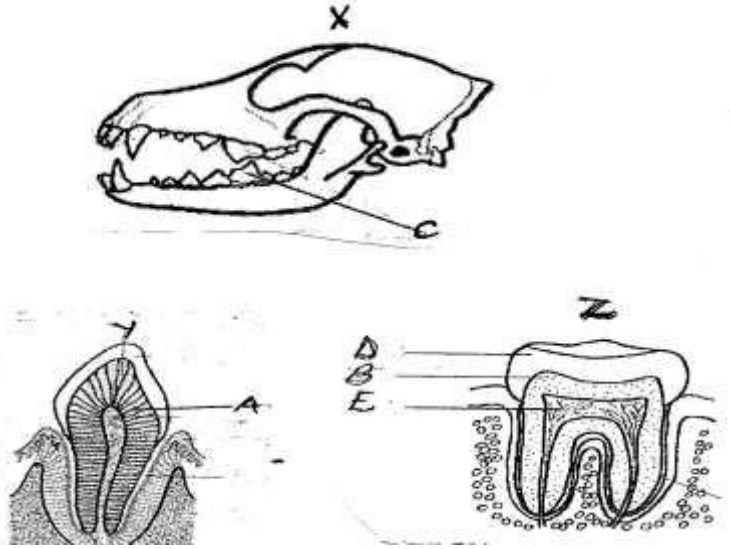
After at least 30 minutes remove the visking tubing from the beaker and wash the outside of the tubing thoroughly to remove traces of liquid **Q2**.

   b) Using the same reagents, test the food substance in liquid Q1 in the visking tubing. Record your observations and conclusion in the table below. (2mks)

Liquid	Observation	Conclusion
Q1		

   c) i) **Name** the physiological process being demonstrated by this experiment. (1mk)
   ii) Name two parts of the human body where the process named in (c) (i) above takes place. (2mks)
   d) Account for the results obtained after carrying a second food test on liquid Q1. (2 mks)

2. You are provided with diagrams of specimens taken from a mammal. Study them carefully and answer the questions that follow.



a) Identify the diagrams labeled below. X , Y and Z (3 marks)

b) State the diet of the animal from which diagram x was taken and give a reason for your answer. (1 marks)

(i) Diet

(ii) Reason (2 marks)

c) Name the parts labeled A,B and D (3 marks)

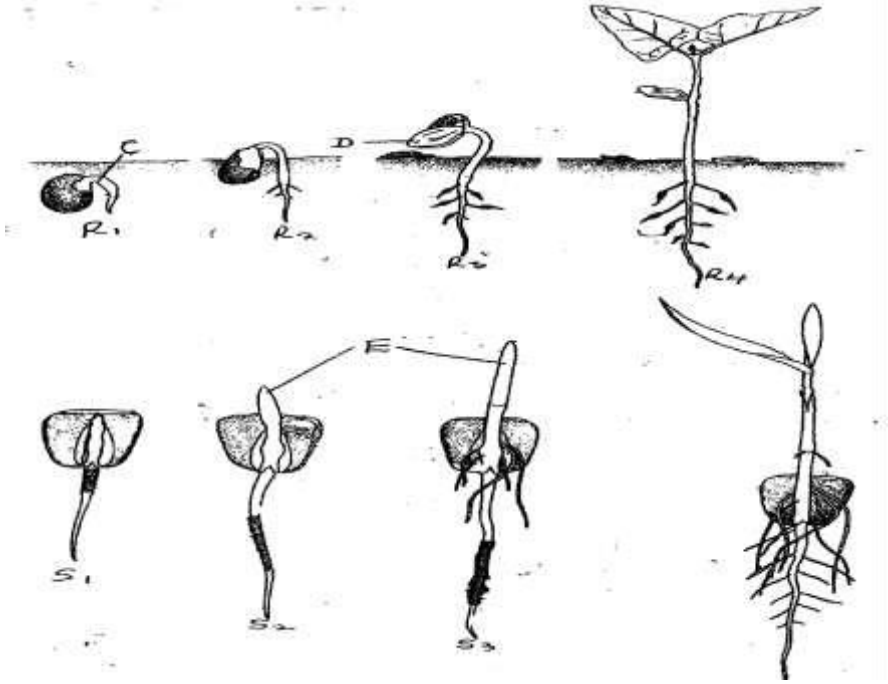
d) How are the following structures adapted to their functions (2 marks)

e) State the function of the parts labeled. (2 marks)

f) State **one** structural difference between Y and Z (1 mark)

3. Examine the seedling below and use them to answer the question that follow.

a) Name the part labeled C,D, E and state their importance for the seedling.



b) The R series of seedlings on the roots later in its life:

(i) What is the name of the swelling: (1mk)

(ii) Name the organisms that would be found in the swellings
(1mk)

(iii) Explain the relationship that exists between the named organisms and the plant.
(1mks)

c) (i) State the types of germination exhibited by R series of the seedlings.
(1mk)

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

d) State any two external factors necessary for germination.
(2mks)

MWINGI CENTRAL SUB-COUNTRY EXAMINATION
Kenya Certificate of Secondary Education (KCSE)
231/1

BIOLOGY (THEORY)
PAPER 1

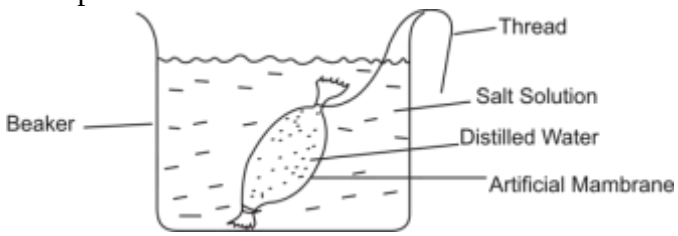
TIME: 2 HOURS

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1. Give the name to the study of:
   (a) The cell (1mark)
   (b) Micro-organism (1mark)
2. State one function of each of the following cell organelles (2marks)
   (i) Lysosomes
   (ii) Ribosomes

3. A student drew a 3cm long diagram of a plant flower. If the actual length of the flower was 6cm, calculate the magnification of drawing made by the student. Show your working.
   (2marks)

4. An experiment was set up as shown below

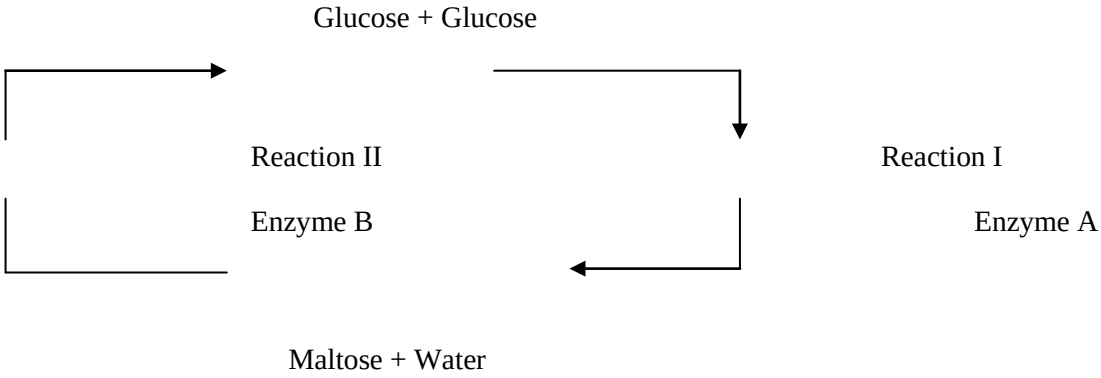


The set up was left for 30 mins.

(a) What was the aim of the experiment (1mk)
(b) State and explain what would be observed after 30 minutes.
(3mks)

5. (i) Explain why insectivorous plants trap and digest insect (2mks)
(ii) Name the type of response in 5(i) above (1mk)

6. The diagram below shows chemical reactions I and II which are controlled by enzymes.



(i) Into which class of carbohydrates is maltose (1mk)

(ii) Name reaction I and enzyme A (2mks)

Reaction I

Enzyme A

7. (i) Identify the mode of feeding of the animal whose dental formula is shown below (1mk)

$$I\ \frac{O}{3}\quad C\ \frac{O}{O}\quad PM\ \frac{3}{3}\quad M\ \frac{3}{3}$$

(ii) Give reasons for your answer in 7(i) above (2mks)

8. Explain each of the following:

(a) A mature plant cell does not lose its shape even after losing water (1mk)

(b) Xylem vessels do not collapse even when they are not conducting water (1mk)

9. Burning charcoal stove in a poorly ventilated room is likely to cause death of the inhabitants. Explain. (3mks)

10. Name two structures for gaseous exchange in aquatic plants (2mks)

11. Why should respiratory surfaces be:

(i) Moist (1mk)

(ii) Highly vascularised (1mk)

12. A process that occurs in plants is represented by the equation below.

$C_6H_{12}O_6 \longrightarrow 2C_2H_5Oh + 2CO_2 + Energy$

(Glucose) (Ethanol) (Carbon VI oxide)

(a) Name the process (1mk)

(b) State the economic importance of the process named in (a) above (2mks)

13. Give two reasons why animals have specialized organs for excretion as compared to plants. (2mks) 14. Explain why the body temperature of a healthy human being must rise up to 39^0C on a humid day. (2mks) 15. A student in form 3 caught an organism which had the following characteristics.

(i) Body divided into two parts

(ii) Simple eyes

(iii) Eight legs

Classify the organism up to the class level (3mks)

16. State the importance of decomposers in an ecosystem (2mks)

17. State the role of the following hormones

(a) Prolactin (1mk)

(b) Oxytocin (2mks)

18. (i) How do the following mechanisms hinder self-pollination
    (a) Protandry (1mk)
    (b) Protogyny
    (ii) Which plant growth hormone induces parthenocapy (1mk)
19. (i) State two importances of metamorphosis to the life of insects (2mks)
    (ii) Name the hormone that is responsible for apical dominance (1mk)
20. (i) Name an importance of non-dissuction in agriculture (1mk)
    (ii) State two disorders caused by gene mutation (2mks)
21. (i) Give a reason why it is only mutation in genes of gametes that can influence mutation (1mk)
    (ii) Differentiate between convergent and divergent evolution (2mks)
22. (i) State the importance of thigmotropism (2mks)
    (ii) Chloroplasts in a palisade cell move away from extreme light intensity. Name the type of response by the chloroplast (1mk)
23. (i) State the components of peripheral nervous system (2mks)
    (ii) Give a reason for the presence of white matter in the central nervous system (1mk)
24. Name the type of joint founel between:
    (a) Humerous and ulna (1mk)
    (b) Femur and Pelvic Girdle (1mk)
25. Give the importance of support in plants (3mks)
26. Name the two hormones that prepares a person for emergency (2mks)
27. (i) Explain why trypsin is secreted in inactive form (1mk) (ii) State the inactive form of the above mentioned enzyme in 27 (i) (1mk)
28. (i) State why green plants are termed as primary producers (1mk) (ii) State one adaptation of aquatic plants to photosynthesis (1mk)
29. State three ways in which support is brought about in a leaf of a terrestrial plant (3mks)
30. Briefly explain how double fertilization occurs in the embryo sac of a flowering plant (3mks) 31. State the hameostatic functions of the following hormone.
    (i) Insulin (1mk) (ii) Glucagon (1mk)

MWINGI CENTRAL SUB COUNTRY EXAMINATION
Kenya Certificate of Secondary Education (KCSE)
231/2

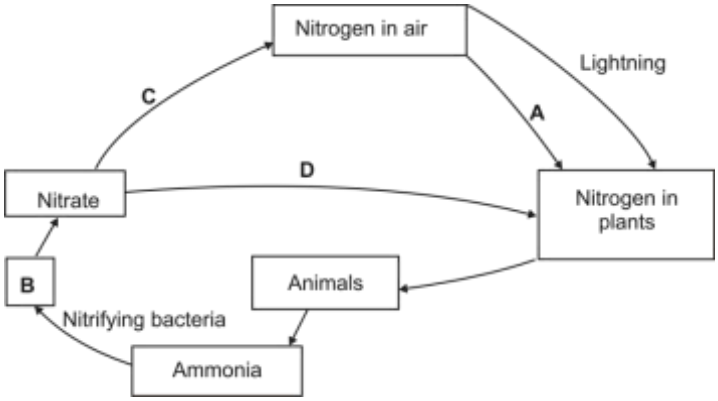
BIOLOGY (THEORY)
PAPER 2

TIME: 2 HOURS

SECTION A (40MARKS)

Answer ALL questions in this section in the spaces provided.

1. Below is a diagram of nitrogen cycle. Study it and answer the questions that follows.

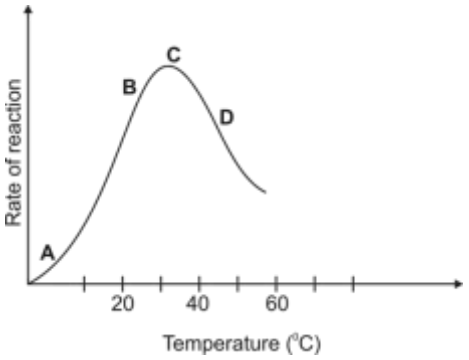


(a) Name the processes represented by: A and B (2marks)
(b) Name the compound represented by B (1mk)
(c) Name the group of organisms represented by C (1mk)
(d) (i) Identify the class of the plants to which the above cycle takes place (1mk)
(ii) Name the part of the plant where process A takes place (1mk)
(e) How would use of excessive pesticides affect process A (2mks)

2. A pure breeding black guinea pig was crossed with a pure breeding white guinea pig, the offspring had a coat with black and white patches
(a) (i) Draw a genetic across to show the F2 of this cross (use letter G to represent gene for black coat and H for white colour) (4mks)

(ii) From the cross, work out the genotypic ratio of F2 (1mk)
(b) State the phenotypic ratio of the F2 above (1mk)
(c) (i) Name the genetic expression of the colour observed in F1 (1mk)
(ii) Give an example of a trait in man where the condition named in c(i) above is expressed (1mk)

3. The graph below show the rate of an enzyme controlled reaction against temperature (OC)



Explain the shape of the curve:

(i) Between A and B (2mks)
(ii) At Point C (2mks)
(iii) Between C and D (2mks)
(iv) Other than temperature, state two factors that affect the above reaction (2mks)

4. (a) Explain the fate of excess amino acids in the liver (4mks)
(b) Name the parts of the human nephron that are only found in the cortex (2mks)
(c) What would happen if a person secreted less antidiuretic hormone into the blood circulation (2mks)

5. The question below represents a chemical equation that takes place in green plants under certain conditions

Carbon (IV) Oxide + water $\longrightarrow$ Glucose +X

(a) Name substance X (1mk)
(b) Other than the conditions stated in the equation, state two other conditions necessary for the reaction (2mks)
(c) Name two types of cells in which this process occurs (2mks)
(d) Name the process represented by the equation given above (1mk)
(e) State the importance of the process named in 5(d) above (2mks)

SECTION B (40 MARKS)

Answer question 6 (compulsory) and either question 7 or 8 in the spaces provided after question 8.

6. A certain experiment was performed to demonstrate the effect of sweating on human body temperature. Boiling tubes A and B were filled each with water their initial temperatures recorded. This was repeated after every 5 minutes. The surface of Tube A was continuously wiped with a piece of cotton wool which had been soaked in methylated spirit. The results are as shown below.

Time (Min)	**Temperature O^C in tubes**	
	A	B
0	80	80
5	54	67
10	40	59

15	29	52
20	21	47
25	18	46

(a) On the same axis, plot graphs of water temperature against time (min) (8mks)
(b) Find the rate of cooling in test tube A (1mk)
(c) Why was tube B included in the set up? (1mk)
(d) Name two ways through which heat is lost in tube B (2mks)
(e) State the expected results if tube A was insulated (1mk)
(f) Name the structures in the following organisms that would insulate heat loss
(i) Birds (1mk)
(ii) Mammals (1mk)
(g) Name any two receptor cells on the skin of man (2mks)
(h) Describe the response of hair on the skin during cold weather (3mks)

7. (a) What is meant by the term natural selection (2mks)
(b) Describe how natural selection results to speciation (8mks)
8. (a) State four characteristics of gaseous exchange surfaces (4mks)
(c) Describe the mechanism of gaseous exchange in a named mammal (16mks)

MWINGI CENTRAL SUB-COUNTY JOINT EXAM
231/3
BIOLOGY PAPER 3
CONFIDENTIAL

In addition to general laboratory apparatus, the teacher in charge of Biology should avail the following for each student.

1. Bougainvillea flower
- Iodine solution labeled P
- Benedict's solution labeled Q - DCPIP labeled R
- Sodium hydroxide labeled S
- Copper (II) Sulphate labeled T
- Solution K

NB: Solution K is prepared by mixing 10g of maize flour, 5ml of pineapple juice in 100ml of distilled water for 10 students. For more than 10 students, use the ratios to prepare solution for your students. -

4 clean test tubes in a test tube rack

- Dropper
- Source of heat

MWINGI CENTRAL SUB-COUNTY JOINT EXAMS
Kenya Certificate of Secondary Education
231/3
BIOLOGY
PAPER 3
PRACTICAL
TIME: 1 ¾ Hours

1. You are provided with specimen labeled X, use it to answer questions that follow.
   (a) (i) State the agent of pollination
   (1mk)
   (ii) Give reasons for your answer in a(i) above
   (2mks)
   (b) Describe the floral parts of specimen X

Floral	Description

(8mks)

   (c) (i) State the class to which the specimen X belongs (1mk)
   (ii) Give reason(s) for your answer in c(i) above
   (2mks)

2. (a) You are provided with reagents P – Iodine, Q – Benedits solution, R-DCPIF, S-Sodium hydroxide and T-Copper (II) sulphate)
Use the reagents to identify the food substance(s) in solution K

Food	Procedure	Observation	Conclusion

(12mks)

   (b) Name the end product of digestion of food substance(s) present in solution K (1mk)
   (c) Describe the assimilation of food substance(s) identified in 2(a) above (2mks)

3. Study the photograph T provided and answer the questions that follow.
   (a) (i) Name the class to which the specimen belongs (1mk)
   (ii) Give reasons for your answer in a(i) above
   (2mks)
   (b) (i) Describe the shape of the specimen (1mk) (ii) What is the significant of your description 6(i) above (1mk)
   (c) Measure in millimeters the depth of:
   (i) Specimen from the tip of the mouth to the tip of the tail (1mk)
   Length_____mm

   (ii) Tail from the anus to the tip of the tail (1mk)
   Length_____mm

(iii) Using the measurement in c(i) and c(ii) above, calculate the tail power (percentage length of tail to the rest of the body)

(2mks)

(d) Name the parts labeled B and D

(2mks)

(e) State one function of the part labeled E

KASSU JOINT EXAMINATION TEST

Kenya Certificate of Secondary Education (K.C.S.E)

231/1

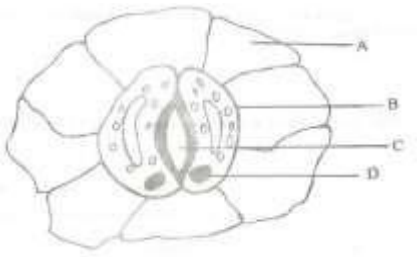
BIOLOGY

PAPER 2

TIME: 2 HOURS

1. In what **two** ways does excretion differ between plants and animals? **(2marks)**
2. (a) Give **two** contributions made by Carolus Linneus to classification **(2marks)** (b) Classify Human being based on the **Order** and **Family** it belongs to? **(2marks)** Order
   Family
3. (a) State **two** functions of the plasma membrane? **(2marks)**
   (b) Give the synthesis role of smooth endoplasmic reticulum.
   (1mark)
4. (a) Distinguish between Plasmolysis and turgidity
   (2marks)
   (b) Explain how the following factors affect active transport
   (4marks) Oxygen concentration Metabolic poisons
5. How is a palisade cell suited to carry out photosynthesis**?** **(3marks)**
6. (a) What is anaphylaxis **(1mark)**
   (b) State the difference between active artificial acquired and active natural acquired immunity
   (2marks)
7. State how the following structural features affect transpiration **(3marks)** Leaf fall
   Sunken stomata

   Thin cuticle
8. The diagram below represents a specialized plant structure



(a) Name the cells labelled A and B (**2marks)** (b) Describe the mechanism of closing of aperture C **(4marks)**

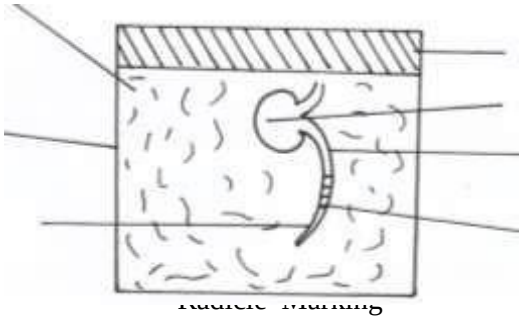
9. Name the causative agent of whooping cough
   (**1mark)**
10. State the economic importance of the following excretory products in plants **(2marks)** Nicotine
    Quinine
11. Give **three** distinguishing features of class Aves **(3marks)**
12. State two differences in the roots of ***Monocotyledonae*** and ***Dicotyledonae?*** (**2marks)**

Monocotyledonae	*Dicotyledonae*

13. A student set up an experiment as shown in the diagram below.

Cotton wool

Cork



Bean seedlings

Radicle Marking

a) (i) What was being investigated in the experiment? (1mark)

(ii) Draw a diagram to indicate the expected results of the experiment after three days. (2mks)

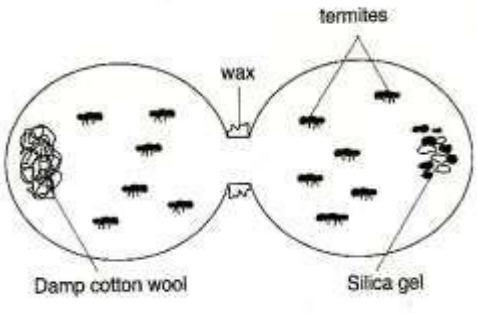
(iii) Why was it necessary to have wet cotton wool in the container (1mark)

(b) What is the role of the following in a germinating seed (2 marks)

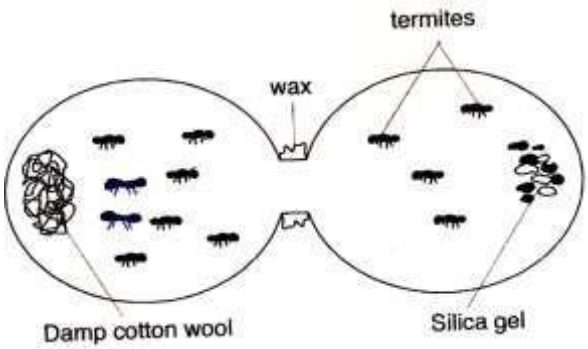
(i) Oxygen

(ii) Cotyledons

14. The following set up was used in an experiment



At the start of experiment



at the end of experiment

(a) State the function of the following in the set up (3 marks)
i). damp cotton wool
ii) Silica gel.
iii) Wax

b) Deduce the condition that must be present in a termite habitat (2 marks)

15. a) Give the importance of nitrogen cycle. (1mark)

b) What are the roles of the following organisms in an ecosystem? (2 marks)
Decomposers
Detrivores

16. Define the term:
Greenhouse effect (1mark)
Global warming (1mark)

17. (a) What is organic evolution? (1mark)

(b) Briefly explain how the peppered moth *(Bistonbetularia*) shows natural selection (3marks)

(c) Distinguish between convergent and divergent evolution (2 marks)

18. Study the diagram and answer the questions that follow

(a) In which set-up did the lime water become turbid? (1 mark)

(b) Explain your answer in (a) above (2 marks)

19. State the three structural adaptations of the lungs in mammals (3marks)

20. What are the roles of each of the following on transmission of impulses: (2 marks)
i) Nodes of Ranvier
ii) Myelin Sheath

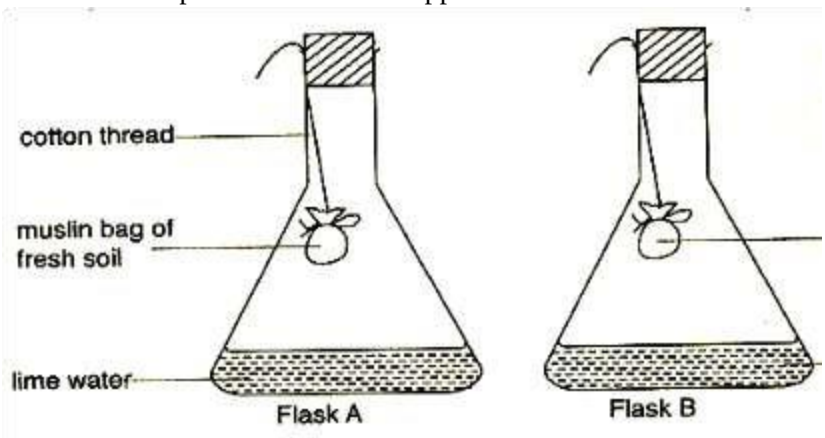
21. (a) Give three effects of over secretion of adrenaline? (3 marks)

21. (a) Define non disjunction? (1 mark)

(b) Name two genetic disorders of the blood. (2marks)

22. (a) How are female parts of wind pollinated flowers adapted to perform their function? (2marks)

23. State how herbaceous plants obtain their support? (3marks)



Muslin bag of baked soil

KASSU JOINT EXAMINATION

Kenya Certificate of Secondary Education

231/2

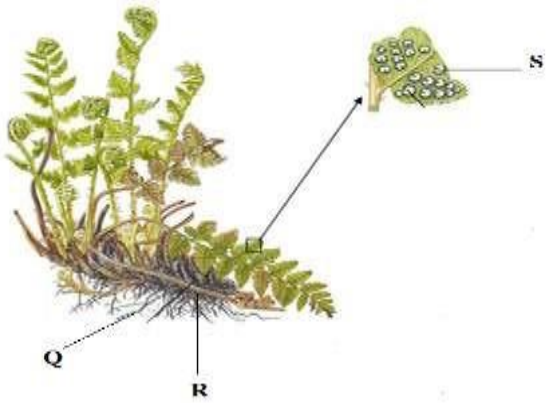
BIOLOGY

JUNE, 2015

2 HOURS

SECTION A

The diagram below indicates an organism that grows under shaded places with damp conditions. Study it and answer the questions that follow.



Answer all questions in this section

1

(a) Name the division to which the specimen belongs. **(1 mark)**

(b) Name and state the functions of the parts labelled Q, R and S. **(6 marks)**

(c) Name the two body forms of the organism in its alternation of generation. **(2 marks)**

2. In cattle the gene for red colour is represented by letter R and that of white colour as W. A Red bull and a white cow were crossed and all the offspring were Roan.

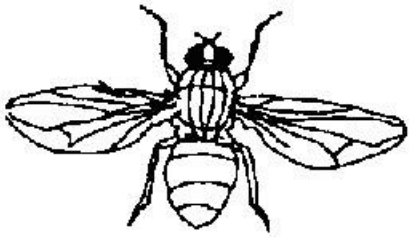
(a) Give a reason for the appearance of roan cattle in F1 generation. **(1 mark)**

(b) Using a punnet square work out the F2 generation. **(4 marks)**

(c) State the genotypic and phenotypic ratio of the F2 offspring above. **(2 marks)**

(d) Name the molecule that carries genetic information in eukaryotic cells. **(1 mark)**

3. Study the diagram of the organism shown below then answer the questions that follow.



(a) State the phylum to which the organism belongs. **(1mark)**

(b) With reasons state the class to which the organism belongs.

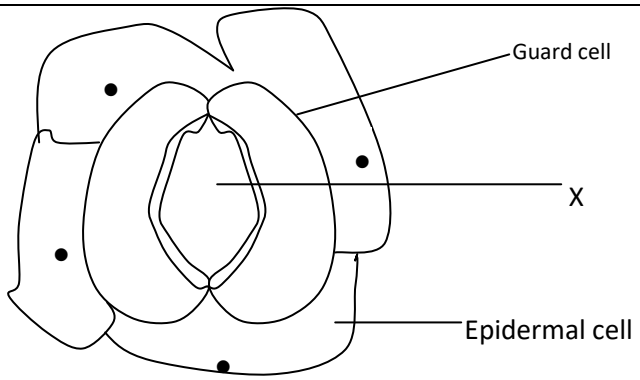
Class **(1 mark)**

Reasons **(3 marks)**

(c) Name **two** human diseases of which the organism is a vector. **(2 marks)**

(d) What type of metamorphis does the organism show? **(1 mark)**

4. The epidermis of a leaf is adapted to have the specialized cells known as the guard cell such as shown below.



(a) (i) Name the structure labelled **X** on the diagram. (1 mark)

(ii) State three adaptations of the guard cell to its function of opening and closing of stomata in plants. (3 marks) (b) The mammalian lung is known to have adapted the mammal to terrestrial habitat by having a pleural membrane.

(i) State **two** functions of a pleural membrane that gives the mammal advantage over other organisms. (2 marks)

(ii) Name **two** diseases of the respiratory system. (2 marks)

5. The human ear has the following structures; (i) Auditory meatus (ii) ear drum (iii) eustachian tube (iv) ear ossicles and (v) cochlea.

(a) Name **two** functions of the mammalian ear. **(2 marks)**

(b) For each of the structures above, state its function. **(5 marks)**

(i) Auditory meatus

(ii) Eardrum

(iii) Eustachian tube

(iv) Ear ossicles (v) Cochlea

(c) Name a defect caused by damage of the cochlea. **(1mark)**

SECTION B:

Answer question 6 (compulsory) and either question 7 or 8 in the spaces provided.

6. A physiologist working to determine the amount of glucose levels in the iliac artery and hepatic vein per hour after a heavy carbohydrate meal in mg/100ml of blood collected and recorded the following data in a 24 hour period. Study the data and use it to answer the questions that follow.

Amount of glucose in mg/100ml	Iliac artery	2	2	2	2	2	2	2	2	8	12	20	24	20	24	22	28	20
	Hepatic vein	20	22	24	24	24	24	18	12	6	4	2	2	2	2	2	2	2
	Time of day	00	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.0	12.0	13.0	14.0	15.0	16.00

(a) On the same axes plot a line graph to show amount of glucose in mg/100ml of blood against time of the day in a 24hour day up to 4.00 p.m.
(8 marks)

(b) At what time of day was the amount of glucose the same in the iliac artery and iliac vein? (1 mark) (c) Account for the rise in glucose levels in the iliac artery peaks at: (3 marks) (i) 11.00 hrs a.m.
(ii) 14:00 hrs p.m.

(d) Which organ and hormone is responsible for raising the sugar levels in Hepatic vein between 00.00 hrs – 2.00 hrs a.m.

(2 marks)

Organ

Hormone

(e) Name the hormone responsible for the fall of glucose and the complex polysaccharide that forms between 14:00 hrs p.m. and
6.00 hrs p.m. (2 marks)

Hormone -

Complex polysaccharide -

(f) Name a disease that would have resulted if the hormone in (e) above failed to be produced. (2 marks)

7. (a) Explain the role of the following factors in germination

(i) Oxygen (2marks)

(ii) Water (3 marks)

(iii) Gibberellic acid (1 mark)

(b) (i) Describe the various modes of adaptation for the flat worm of the blood *Schistosoma mansonii* (8 marks)

(ii) State the effects of *Schistosoma mansonii* on its primary host, the human (12 marks)

8. (a) Describe how the digestion of a protein is achieved in the following portions of the alimentary canal.

(i) Stomach (4 marks)

(ii) Duodenum (4 marks)

(b) (i) Describe the process of absorption at the root hair to the xylem of the root. (8 marks)

(ii) Describe how temperature and light intensity affect the rate of transpiration. (4 marks)

KASSU JET EXAMINATION
231/3
BIOLOGY PRACTICAL
PAPER 3

CONFIDENTIAL INSTRUCTIONS TO SCHOOLS

Each candidate will require:

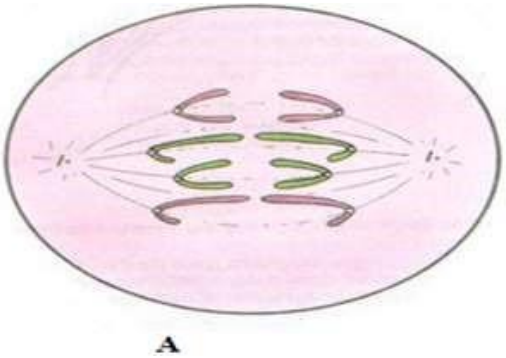
- Specimen **S** (A sukuma wiki - Kale) leaf.
- Coloured photographs on page 3 of the question paper.
- Specimen **L** (Thoracic vertebra).
- Specimen **M** (Lumbar vertebra).

KASSU JET EXAMINATION
(Kenya Certificate of Secondary Education)

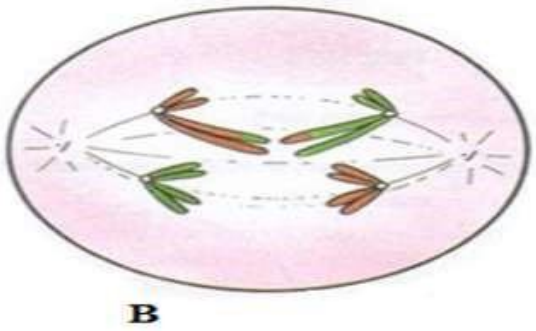
231/3
BIOLOGY PRACTICAL
PAPER 3
Time: 1 ¾ Hours

1. You are provided with specimen **S**. Study the specimen carefully then answer questions that follow.
   a) Make a drawing of specimen **S** and label midrib, leaf lamina, leaf margin, and leaf petiole. (3mark)
   b) Name the class to which the specimen belongs. (1mark)
   c) Identify two features of the specimen **S** that may have been used to place it in the class named in (b) above. (2mark)
   d) Using observable features only, explain how the specimen **S** is adapted to its photosynthetic function. (6mark)

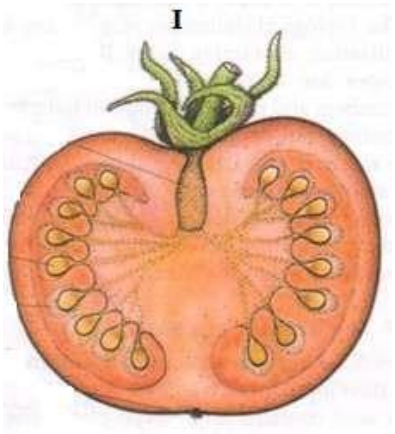
2. Use the photographs provided to answer the questions that follow:



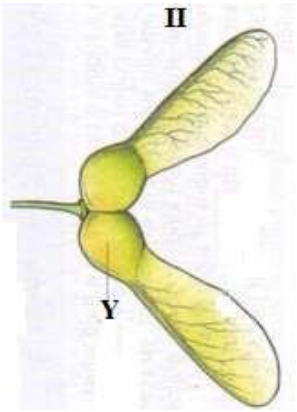
A



B



I



II

Y



III

a) (i) Identify the type of cell division represented in the photographs **A** and **B**. (2mark)

(ii) With a reason, name the stage of cell division represented in each case. (4mark)

(iii) Name the parts of human body where the process **B** represented above occur. (2mark)

b) (i) What type of fruit is represented by photograph **I**? Give two reasons. (3mark)

(ii) Name the agent of dispersal for fruits **II** and **III**. (2mark)

(iii) How are the fruits adapted for the mode of dispersal stated in (b) (ii) above? (2mark)

(iv) Identify the type of placentation shown by photograph **I**. (1mark)

3. You are provided with specimens labeled **L** and **M**. Study them then answer questions that follow:

a) Identify the specimens. L and M (2mark)

b) Name the part of the body where each is found.

(2mark)

c) With which bone does the vertebra **L** articulate, other than those of the vertebral column? (1mark)

d) Using observable features only, state two adaptations of the specimen **M** to its functions. (2mark)

e) Observe the specimen **L** from the anterior view. Name the parts of the vertebra that are most pronounced. (3mark)

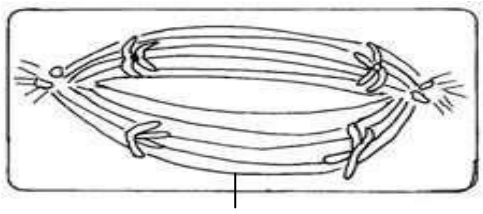
f) Name the cartilaginous pad found between two adjacent vertebrae and state its function. (2mark)

Name

Function

KIRINYAGA CENTRAL SUB-COUNTY JOINT EXAMINATION
231/1
BIOLOGY
PAPER 1
(THEORY)
TIME: 2 HOURS

1. Name the organelles that are abundant in:
   (a) Goblet cells (1 mark)
   (b) Liver cells (1 mark)
2. Give a reason why it is difficult to calculate Respiratory Quotient (RQ) in plants. (2 marks)
3. List **three** advantages of asexual reproduction in plants.
   (3 marks)
4. The diagram below represents a stage during cell division.

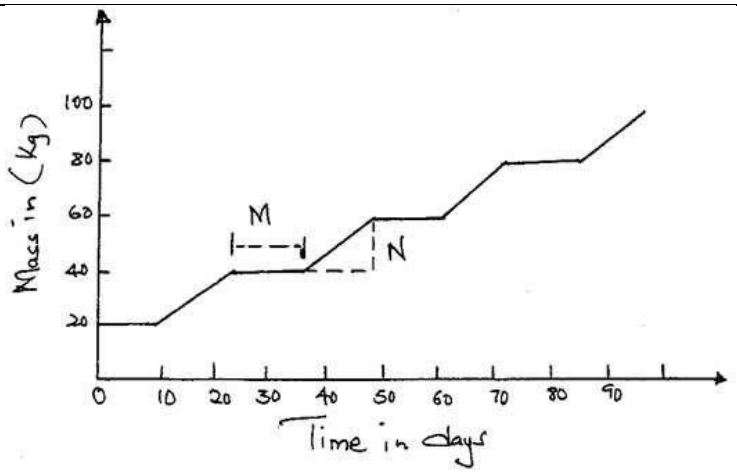


   (a) (i) Identify the stage of cell division. (1 mark)
   (ii) Give a reason for your answer. (1 mark)

   (b) Name the structures labelled **M**. (1 mark)
5. Explain why there is increased heart beat during vigorous exercise in man. (2 marks)
6. (a) State **two** characteristic features of members of division pteridophyta. (2 marks)
   (b) Give **one** way in which pteridophyta differ from spermatophyta. (1 mark)
7. (a) Explain the role of antidiuretic hormone when there is excess water in the human body. (3 marks)
   (b) State the kidney disorder characterized by production of large volume dilute urine. (1 mark)
8. (a) State **one** role of each following hormones in the menstrual cycle.

   (i) Follicle stimulating hormone. (1 mark)
   (ii) Luteinising hormone. (1 mark)

   (b) Explain why hormone testosterone still exerts it‘s influence even when vas deferens have been cut. (2 marks)
9. The graph below represents growth pattern in a certain group of animals. Study it and answer the questions that follow.



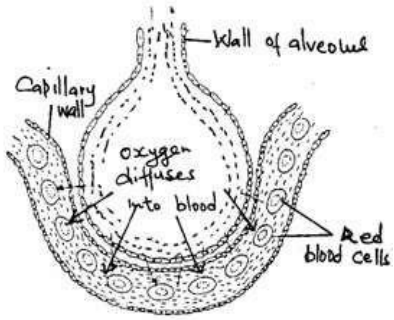
(a) Name the type of growth curve. (1 mark)
(b) Name the animal phylum that shows this type of growth pattern. (1 mark)
(c) Name the process that occurs in part **M**. (1 mark)

10. (a) Name the bacteria found in ceacum of herbivores. (1 mark)
(b) State the association of the bacteria named in (a) above with herbivores. (1 mark)

11. During germination and early growth, the dry weight of endosperm decreases while that of the embryo increases. Explain.

(2 marks)

12. The figure below shows an alveolus in which gaseous exchange take place.



(a) (i) Define the term diffusion. (1 mark)

(ii) What causes oxygen to diffuse into the blood from the alveoli? (1 mark)

(iii) List **two** features of gaseous exchange surfaces in animals, such as humans that are evident in the diagram above.

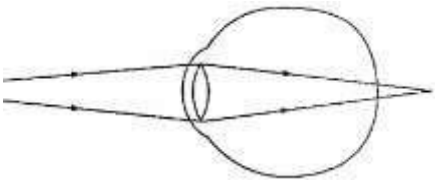
(2 marks)

13. State **two** characteristics that researchers use/select in breeding programmes. (2 marks)
14. (a) Which component of the blood gives the body immunity? (1 mark)
(b) Distinguish between natural and acquired immunity. (2 marks)
15. (a) Define _osmosis'. (2 marks)
(b) State the importance of osmosis in plants. (2 marks)

16. (a) Give **two** evidences that support the theory of organic evolution. (2 marks)
    (b) Why is Lamarcks theory of evolution not accepted by biologists today. (2 marks)
17. The number and distribution of stomata on three different leaves are shown in the table below.

Leaf	Number of stomata	
	Upper epidermis	Lower epidermis
A	300	0
B	150	200
C	2	13

    (a) Suggest the possible habitat of the plant from which the leaves were obtained. (3 marks)
    (b) State **one** modification found in the stomata of leaf **(C)**. (1 mark)
18. (a) State **one** way through which herbaceous plants achieve support. (1 mark)
    (b) Name **three** supporting tissues in plants. (3 marks)
19. (a) One of circulatory systems in animals is open circulatory system. Give the name of the other type of circulatory system found in animals.
    (1 mark)
    (b) State **two** advantages of the circulatory system you have named in (a) above.
    (2 marks)
20. State **two** advantages of metamorphosis to the life of insects. (2 marks)
21. There are at least 205 known sex-linked recessive disorders.
    (a) What is meant by term sex-linkage? (2 marks)
    (b) Name **two** sex-linked traits in humans. (2 marks)
22. The diagram below shows the position of an image formed in a defective eye.

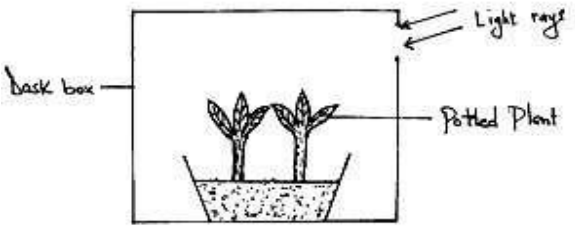


    (a) Name the defect. (1 mark)
    (b) Explain how the defect named in (c) above can be corrected. (2 marks)
23. (a) State the importance of the following processes that take place in the nephron of a human kidney.
        (i) Ultrafiltration. (1 mark)
        (ii) Selective reabsorption. (1 mark)
    (b) In which part of the nephron does ultra filtration take place? (1 mark)
24. A biological washing detergent contains enzymes which remove stains like mucus and oils from clothes which are soaked in water with the detergent.
    (a) Name the two groups of enzymes that are present in the detergent. (2 marks)

Why would the stains be removed faster with the detergent in water at 35□C rather than at 15□C? (2 marks)

25. Explain why it is important to go for Voluntary Counseling and Testing (VCT) on HIV/AIDS. (2 marks)

26. In an experiment young potted seedlings were placed in a dark box with unilateral light source as shown below.



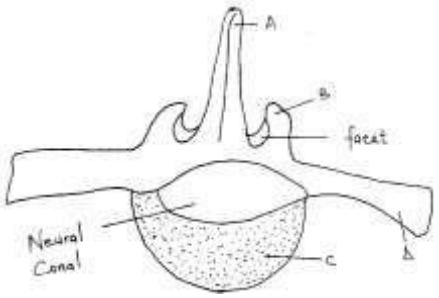
(a) What was the aim of the experiment? (1 mark)

(b) State the observation made of on the seedling after 3 days. (2 marks)

KIRINYAGA CENTRAL SUB-COUNTY JOINT EXAMINATION
231/2
BIOLOGY
PAPER 2
(THEORY)
TIME: 2 HOURS
SECTION A: (40 MARKS)

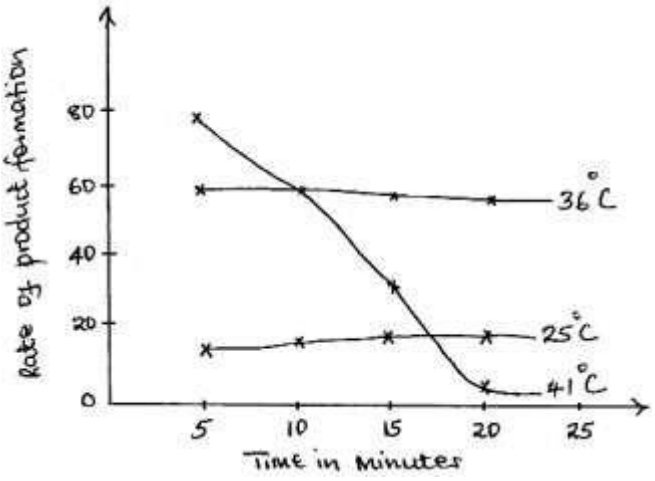
Answer all the questions in this section in the spaces provided:

1. Study the diagram shown below of the anterior view of a lumbar vertebra of a mammal.



(a) Name the parts labelled: A,B,C (3 marks)
(b) State the function of the part labelled **D**. (1 mark)
(c) State **three** roles of skeletons in organisms. (3 marks)
(d) State how the part labelled **D** in adapted for the function stated in (b) above. (1 mark)

2. The graph below shows rates of photosynthesis in a plant at different temperatures.



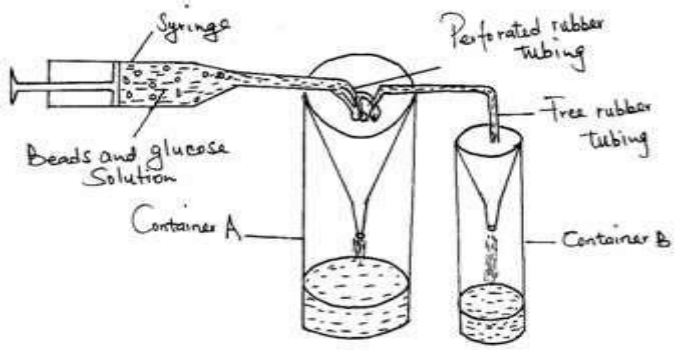
(a) Account for the decrease in the rate of product formation at 41□C from 5 to 20 minutes. (2 marks)

(b) Explain the results obtained at
(i) 25□C. (2 marks)
(ii) 36□C. (2 marks)

(c) (i) Other than temperature, state **one** external factor that affect the rate of photosynthesis. (1 mark)

(ii) Suggest the product which could have been used in the experiment. (1 mark)

3. The diagram below shows a model of the nephron of a mammalian kidney.



(a) Which parts of the nephron are represented by the:

(i) Syringe? (1 mark)
(ii) Perforated rubber tubing? (1 mark)
(iii) Free rubber tubing? (1 mark)

(b) Name the type of filtration taking place within the perforated rubber tubing. (1 mark) (c) What would happen to the contents of the syringe if its handle was slowly pushed forward? Explain. (4 marks)

4. The table below shows the number of Leopards and Impala in a grassland park over a period of six years.

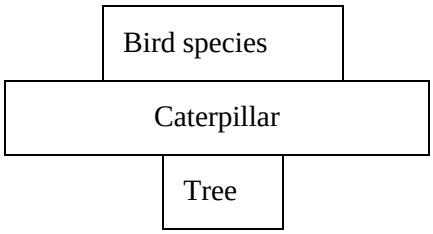
Time in years	1	2	3	4	5	6
Number of Impala	360	498	546	216	120	72
Number of Leopard	11	17	25	7	3	2

(a) (i) What is the average number of Impala in the park during the six years. (2 marks)
(ii) Account for the decrease in the number of leopards between the 4th and 6th year? (3 marks)

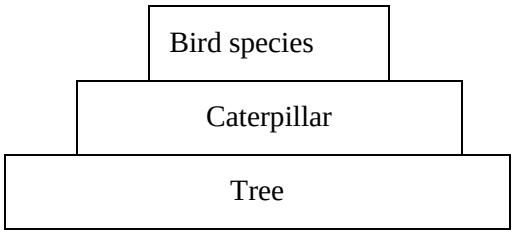
(b) Identify the trophic level occupied by
(i) Leopards (1 mark) (ii) Tick feeding on the leopard. (1 mark)

(c) The **two** pyramids shown were obtained in the park.

I



II



(i) Identify each type of pyramid. (2 marks)

5. A pea plant with smooth seeds was crossed with one with wrinkled seeds. The gene for smooth seeds is dorminant over that for wrinkled seeds. Use letter R to represent the dorminant.

(a) State the genotype of the parents if the plant with smooth seeds was heterozygous. (2 marks)
(b) State the gametes produced by the smooth seeds and wrinkled seeds parents. (2 marks)
(c) State the genotype and phenotype of F1 generation. Show your working. (4 marks)

SECTION B:(40 MARKS)

Answer question **6 (Compulsory)** and **EITHER** question **7** or **8** in the spaces provided after question **8**.

6. An experiment was carried out in which red blood cells were put in salt solutions of different concentrations. The table below shows the percentage of cells which were destroyed by haemolysis in different salt concentration.

Salt concentration (g/dm^3)	% of RBC destroyed By haemolysis
0	100
1	100
2	100
2.5	100
3.0	100
3.5	96
3.7	80
4.0	60
4.5	16
4.7	0
5.0	0
6.0	0

(a) Draw a graph of percentage of red blood cells haemolysed against salt concentration. (6 marks) (b) Explain haemolysis of red blood cells. (3 marks)

(c) From the graph, state:

(i) the salt concentration at which 50% red blood cells were haemolysed. (1 mark)

(ii) the highest salt concentration when the largest number of red blood cells were haemolysed. (1 mark) (d) (i) Suggest the normal salt concentration in the blood of the mammal from which the red blood cells were obtained.

(2 marks)

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

(iii) What term is used to describe the solution with equal solute concentration as that of the cells? (1 mark)

(e) Name the process in the human body that ensures that haemolysis of red blood cells is prevented. (1 mark)

(f) State the role of osmosis in organisms. (4 marks)

7. How are respiratory gases, oxygen and carbon (IV) oxide transported to and from tissues in mammals? (20 marks)

8. State and explain how the mammalian small intestines are adapted to perform their function. (20 marks)

KIRINYAGA CENTRAL SUB-COUNTY JOINT EXAMINATION
231/3
BIOLOGY
PAPER 3
(PRACTICAL)

CONFIDENTIAL

Requirement for school:

Question 1

Each candidate should be provided with:

1. A piece of small intestine of about 3cm from a freshly killed cow (with intestinal contents intact)
2. A 50ml beaker.
3. 4 test tubes in a test tube rack.
4. Means of heating.
5. Benedicts solution.
6. Iodine solution.
7. 10% sodium hydroxide solution.
8. 1% copper sulphate solution.
9. Test tube holder.

NB: The small intestine can be bought a day before the exams and preserved.

Question 3

Specimen R – A bony fish e.g. Tilapia (one may be shared between two students).

KIRINYAGA CENTRAL SUB-COUNTY JOINT EXAMINATION
231/3
BIOLOGY
PAPER 3
(PRACTICAL)
TIME: 1¾ HOURS

1. You are provided with a specimen labelled H which is a piece of a mammalian intestine. Squeeze the contents in the lumen into a test tube. Add 3ml of water and shake the contents. Reserve the piece of intestine for question (b).

(a) (i) Use the reagents provided to test for the presence of starch, proteins and reducing sugars in the contents. Record the procedures, observations and conclusions in the table below.

Food substance	Procedure	Observations	Conclusions
Starch			

Proteins			
Reducing sugars			

(9 marks)

(ii) Account for the results obtained in (a)(i) above. (3 marks)

(b) Cut specimen H along its length to expose the inner surface.

(i) Feel the inner and outer surfaces of the specimen. Record your observations. (2 marks)

(ii) Account for our observations of the inner surface. (3 marks)

2. (a) The figure below shows feet of various birds. Study the diagram and answer the questions that follow.



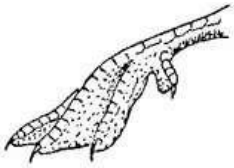
bird A



bird B



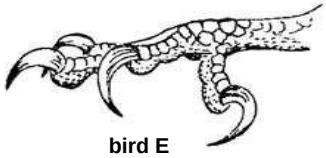
bird C



(i) Name the type of evolution represented by the diagrams. (1 mark)

(ii) Using Darwin's theory of evolution, explain how the feet of **bird E** would have evolved. (3 marks)

(iii) Explain how Larmack could have explained the evolution of feet of bird **C**. (3 marks)



bird E

bird D

(b) Figure 1 represents a bat wing, Figure 2 a whale paddle and Figure 3 an insect wing. Study the diagrams and answer the questions that follow.

Figure 1

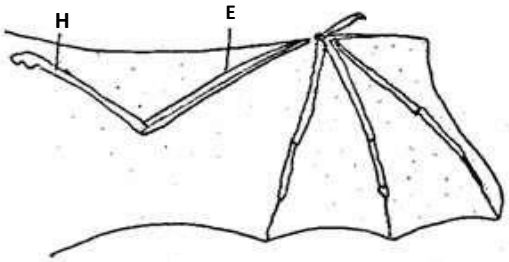


Figure 2

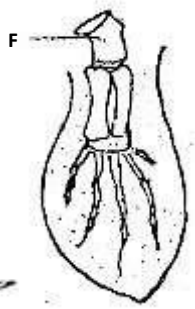


Figure 3



G

(i) Name parts labelled **E** and **F**. (2 marks)
(ii) State **one** difference between the wings in Figure **1** and **3**. (1 mark)
(iii) Name the type of joint found at proximal end of bone marked **H**. (1 mark)

3. (a) You are provided with a specimen labelled R. Using observable features only, identify the class to which the specimen belongs.

Class _____ (1 mark)

List the observable features used to identify the class which the specimen belongs. (3 marks)

(b) Stroke the specimen on the lateral side from the head end to the tail end. Repeat the stroking from the tail end to the head end.
(i) Record your observation. (2 marks)
(ii) Observe the arrangement of the scales. Record your observations. (1 mark) (iii) State the significance of the arrangement of the scales. (1 mark)

(c) Name the observable features that adapt the specimen to:
(i) forward movement. (1 mark)
(ii) Balancing. (1 mark)
(iii) Staying upright. (1 mark)
(iv) Fast movement. (1 mark)

KAMDARA JET
23/1
BIOLOGY(THEORY)
PAPER 1
TIME:2HRS

1. Name the basic functional unit of a kidney. (1mark)
   Name two support tissues in plants strengthened with lignin. (2marks)

2. What is binomial nomenclature? (1mark)
   State the importance of the following in a living organism

   (a) Locomotion (2marks)
   (b) Respiration (1mark)

3. State the functions of the following in the heart. (2marks) (a) Sino Atrio Node (SAN)
   (b) Interventricular septum

4. The table below shows percentage water gain in man and kangaroo rat.

Gains	Human beings	Kangaroo rat
Drinking	48%	0%
Water in food	40%	10%
Metabolic water	12%	90%

Explain why a Kangaroo rat gains a higher percentage of metabolic water than human beings. (2marks)

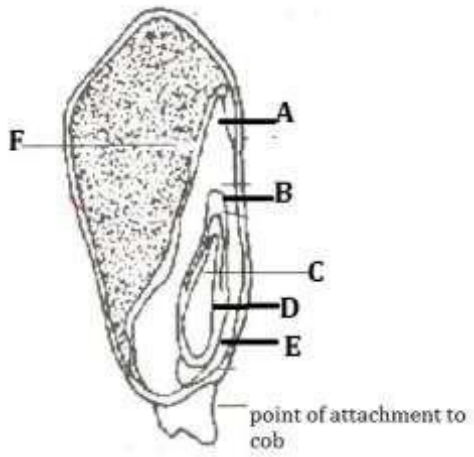
5. State three functions of adrenaline released when a person is faced with an emergency situation. (3marks)

6. Name a disadvantageous gene that is dominant
   (1mark)
7. State the importance of metamorphosis in an insect. (2marks)
8. Name the causative agent of the following diseases. (3marks)
   (a) Whooping cough
   (b) Typhoid
   (c) Syphilis

11 (a) Name two causes of water pollution (2marks)

(b) For each cause named in 11(a) above state a control measure. (2marks)

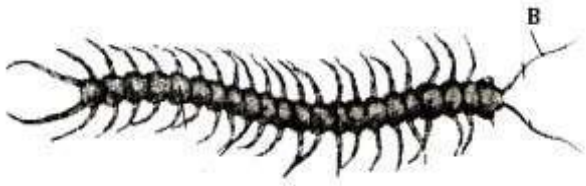
12. Define the following terms in reference to fish locomotion (3marks)
   (a) Pitching
   (b) Rolling
   (c) Yawing
13. Name the type of reproduction in the following organisms. (3marks)
   (a) Yeast
   (b) Bacteria
   (c) Rhizopus
14. The diagram below shows the structure of a monocotyledonous seed



(a) Name the parts B and D
(2marks)
(b) Name the parts that would stain blue black with iodine solution. (2marks)

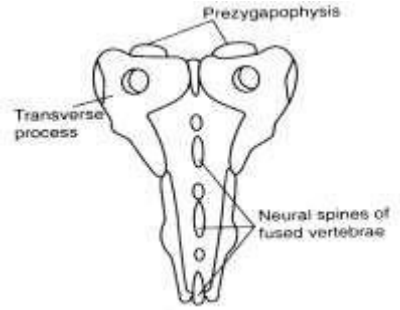
15. State the importance of
(a) Aerenchyma tissue in hydrophytes (2marks)
(b) Salts glands in halophytes (1mark)
16. (a) Explain why osmosis is a special type of diffusion. (1mark) (b.) What is the importance of carriers in active transport. (1mark)
17. Name the cell organelles which would be abundant in
(2marks)
(a) Sperm cell
(b) Pancrease
18. (a) Name the respiratory surface of an insect
(1mark)
(b) State two adaptations of the respiratory surface named in (a) above.

19. State three properties of proteins. (3marks)
20. What is the role of light energy during photosynthesis
(2marks)
21. Use the diagram below to answer the questions



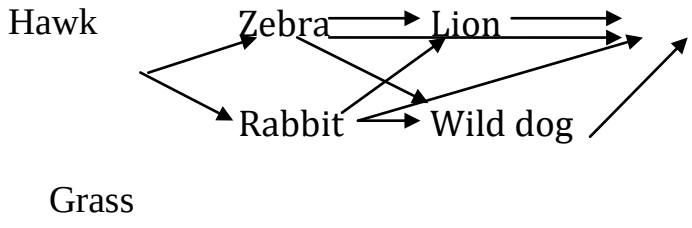
(a) Identify the class which the organism belongs (1mark)
(b) Give two observable characteristics to justify your answer in (a) above (2marks)
22. Name two main mineral ions required for transmission of a nerve impulse
(2marks)
23. Name an old age disease associated with the following body organs (2marks) (a) Eye (b) Ear
24. Explain the following terms as used in evolution. (3marks)
(a) Struggle for existence
(b) Divergent evolution
(c) Vestigial structure
25. State two adaptations of xylem tissues in plants. (2marks)
26. (a) Name a compound that stores energy in a cell (1mark)
(b) Explain why cell membrane is semi-permeable. (1mark)

27. The diagram below shows type of vertebrae fused to form a rigid structure.



(a) What is the name of the rigid structure? (1mark)
(b) What is the importance of the rigid structure in human beings? (2marks)

28. Study the food web below and answer the questions below



(a) Name the organism occupying the highest trophic level (1mark)
(b) Construct two food chains with wild dog as secondary consumer. (2marks)

29. State three roles of Gibberellins in plant (3marks)

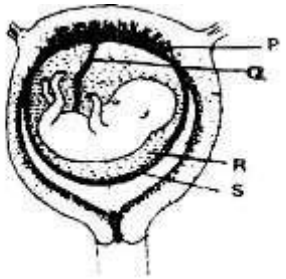
30. Cardiac muscles are myogenic while skeletal muscles are neurogenic. Explain (2marks)

31. (a) State two adaptations of the oviduct in female reproductive system. (2marks) (b) Name the hormone involved in
(i) Milk production (1mark)
(ii) Development of male secondary sexual characteristics. (1mark)

32. Explain why it is difficult for scientist to make a vaccine against plasmodium which causes malaria. (2marks)

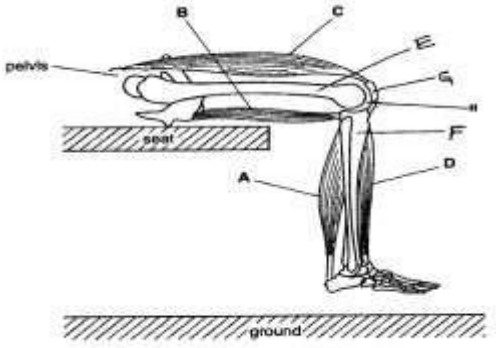
KAMDARA JOINT EVALUATION TEST
231/2
BIOLOGY PAPER 2
(THEORY)
TIME: 2 HRS
SECTION A: (40 MKS)

1. The diagram below represents a human foetus and a uterus.



(a) Name the part labeled S (1 mark)
(i) Name the types of blood vessels found in the structure Q. (2 marks)
(ii) State the difference in composition of blood in the vessels named in b (i) above. (2 marks)
(b) State two structure adjustment in the circulatory system of the baby at birth. (2 marks)

2. The diagram below shows the bones and muscles of a human leg when seated.



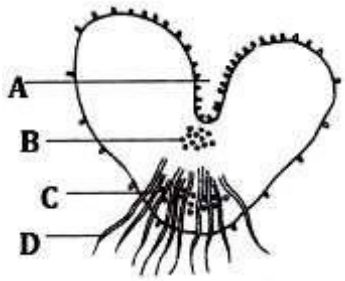
(a) Name the bones A and F (2 marks)
(b) Muscles in the leg work antagonistically to muscle A

(i) What is meant by antagonistic? (1 mark)
(ii) State two structural difference between muscle A and muscle found in the esophagus. (2 marks)
(c) (i) Name the type of joint formed by the articulation of bones E, F and G (1 mark)

(ii) State one difference between the joint named in C (ii) and the one which bone E make at the proximal(1 mark)
end.

(d) State the function of the substance found in part labeled H. (1 mark)

3. The diagram below shows the gametophyte of a fern



(1 mark)

(a) (i) Name the structure shown above

(ii) Name the part labeled: B and C

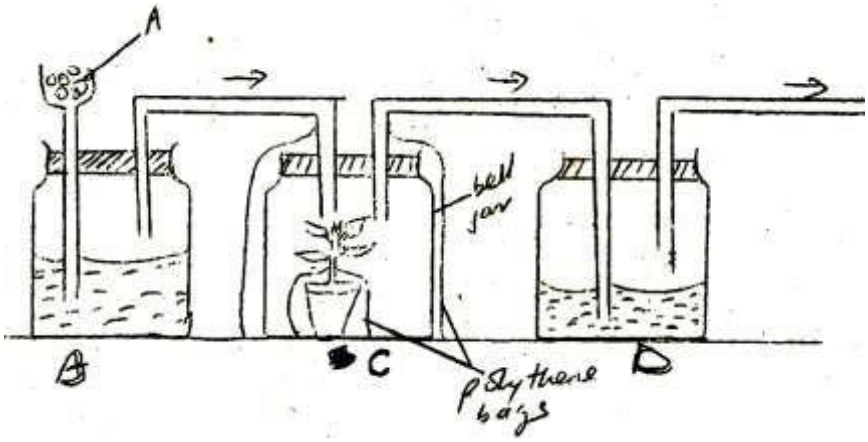
(b) (i) Define the term alternation of generation. (1 mark)

(ii) Name two plant division that exibit alternation of generation. (2 marks)

(c) State three features in terms that make them advanced the moss plant. (3 marks)

(d) State the importance of gametophyte to a sporophyte. (1 mark)

4. The diagram below illustrate an experiment to demonstrate some aspects of respiration in a potted plant.



(a) Name and state the role of the chemical compound labeled A (2 marks)

Chemical compound

Role played

(b) What aspect of respiration is being demonstrated? (1 mark)

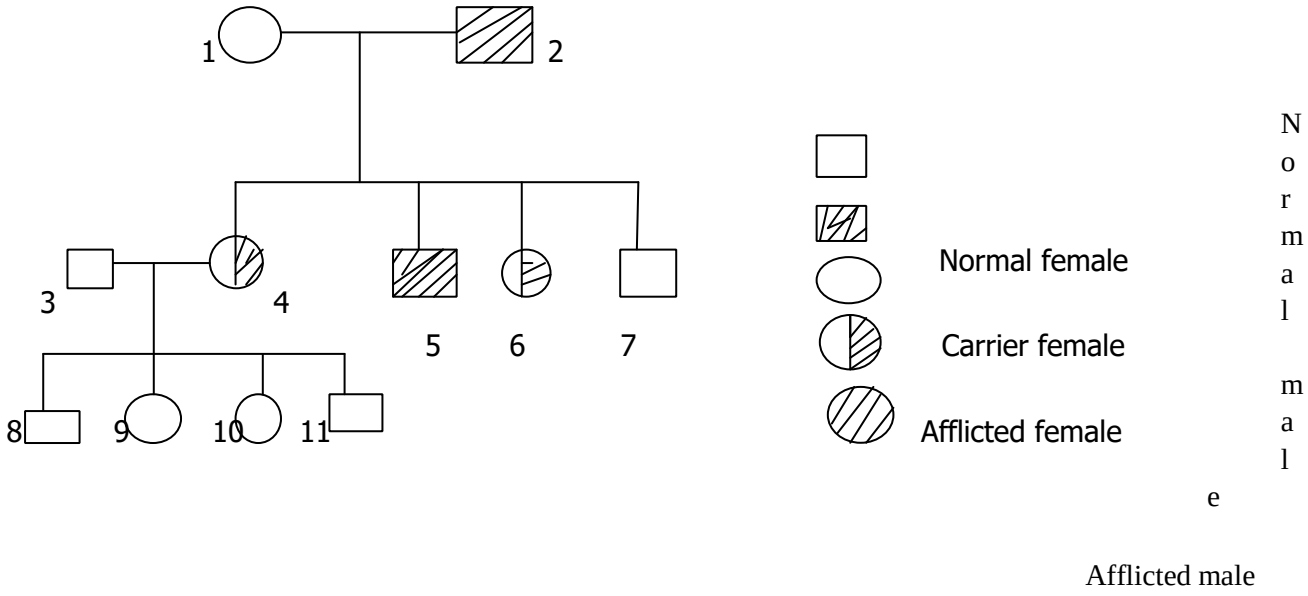
(c) Name the reagents in set up B and D. (1 mark)

(d) What would be the results in set up B and D after the experiment has run for some time. (2 marks) Set up B

Set up D

(e) State the importance of covering the bell jar in set up C with a black polythene bag. (1 mark) (f) Why was it necessary to enclose the pot with a polythene bag.
(1 mark)

5. The pedigree chart below illustrates the inheritance of muscle dystrophy in 9 given family.



(b) Suggest the possible genotypes of individual 2, 4, 7 and 9. Use the letter D to represent the gene for normal muscle formation.
(c) Explain why there are no male carriers.
(d) Work out the phenotypic ratio of off springs from individual number 4 and an afflicted male.

SECTION B (4 MARKS)

Answer question B compulsory and either 7 or 8 in the spaces after question 8.

6. The following data results of making daily growth measurement on an organism over a period of 24 days during its development.

DAY	WIDTH OF HEAD (MM)	LENGTH OF HIND FEMUR 1MM
1	3.0	7.0
2	3.5	7.5
3	4.0	8.0
4	4.0	8.0
5	4.0	8.0
6	4.0	8.0
7	4.0	8.0
8	4.4	9.2
9	4.7	10.5
10	5.0	12.0
11	5.0	12.0
12	5.0	12.0
13	5.0	12.0
14	5.0	12.0
15	5.0	12.0
16	5.0	12.0
17	5.6	13.3
18	6.4	14.8
19	7.0	16.4
20	7.6	18.0
21	7.6	18.0
22	7.6	18.0
23	7.6	18.0
24	7.6	18.0

(a) Using a suitable scale, draw graphs of width of head and length of femur against time. Draw the graphs on the same axis.

(8 marks)

(b) (i) Name the growth pattern represented by the graphs. (1 mark)

(ii) With reference to your graph, identify the phylum to which the organism belongs. Give a reason for your answer.

(2 marks)

(c) (i) Account for the length of hind limb (femur) between day 3 and day 7.
(3 marks)

(ii) Day 7 and day 10. (2 marks)

(e) State the hormones involved in the growth pattern represented by the graphs. (2 marks (e) State two advantages for metamorphosis in organisms.
(2 marks)

7. Describe that played by the liver in:

(a) Protein metabolism (8 marks)

(b) Regulation of blood sugar (12 marks)

9. Describe the movement of water from the soil upto the leaves and then into the atmosphere.
(20 marks)

KAMDARA JET

231/3
CONFIDENTIAL
REQUIREMENTS

M – *solanum incanum* (sodom apple) flowers

N – Hibiscus flowers

- Blades
- Microscope slide
- Cover slips
- Microscopes
- Iodine solution
- L – diastase / invertase
- 0.1%, 1.4% sodium chloride solution
- Benedicts solution
- Thermometer
- Test tubes (3) per candidate
- Test tubes holder
- Water bath maintained at 37^0C
- Hand lens

KAMDARA JOINT EVALUATION TEST
BIOLOGY PRACTICAL
PAPER 3
TIME: 1 ¾ HRS.

1. You are provided with specimen M and N. Examine them.

(a) Describe the arrangement of the stamens in specimen N. (3 marks)

(b) Carefully remove one stamen from specimen M. Examine it using a hand lens. Draw and label it. (4 marks)

(c) Remove another stamen form specimen M, cut the anther transversely into two equal parts. Tap the pollen grains from the lower half onto a microscope slide. Add a drop of iodine. Place a cover slip and pass on the covers slip gently to spread out the pollen grains.

Observe the pollen grains under medium power.

Draw one pollen grain (1 mark)

(d) Remove an anther from N. Place it on a microscope slide. Add a drop of iodine solution. Cover with a cover slip. Press gently on the cover slip to spread out the pollen grains. Observe the pollen grains under medium power.

Draw one pollen grain. (1 mark)

(e) State one observable difference between pollen grains of specimen M and N. (1 mark)

(f) State four observable differences between the corolla of specimen M and N (4 marks)

2. You are provided with a solution labeled L, starch solution and sodium chloride in two different concentrations, 0.1% and

1.4%.

Place 3 ml of starch solution in test tubes labeled 1, 2 and 3. Add 3 drops of 0.1% sodium chloride to the test tube labeled 2 and 3 drops of 1.4% sodium chloride to the test tube labeled 3.

Add 3 ml of solution L to each of the test tubes labeled 2 and 3.

(a) Place a drop of the contents from each test tube 1, 2 and 3 on a white tile.
To each drop add iodine solution;
Record your results in the table below.

(6 marks)

(b) Place the test tubes in a water bath maintained at 37^0C. Allow to stand for 30 minutes. Place a drop of the contents from each test tube on a white tile. To each drop add iodine solution.
Record your observations in the table above;

(c) Add equal amounts of Benedicts' solution to test tube labeled 2 and 3. Boil
Record your observations (2 marks)

Test tube	Observation
Test tube 2	
Test tube 3	

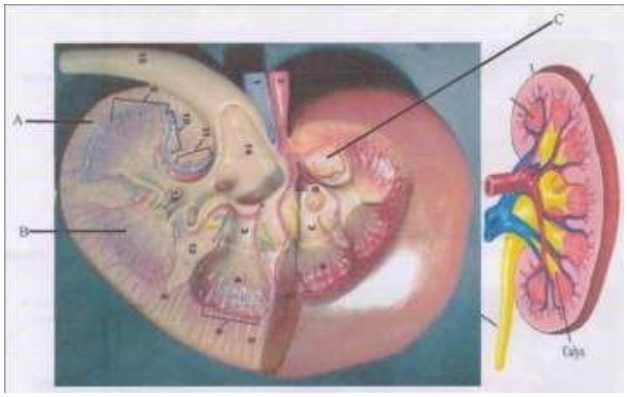
(d) Account for the result in test tube 3 at the end of the experiment.
(2 marks)

(e) Suggest the identity of solution L. (1 mark)

(f) Why was the test tube labeled 1 included in the experiment? (1 mark)

(g) Why were the test tubes placed in a water bath maintained at 37^0C. (1 mark)

3. Below is a section through a mammalian organ.



(a) Identify the section. (1 mark)

(b) Name the parts labeled A, B and C (3 marks)

(c) State three functions of the photographed specimen. (3 marks

(d) Label on the photograph using G and L the region where the Glomerulus and Loop of Henle are located respectively.

(2 marks)

(e) Name a process that occurs in the Glomerulus and Loop of Henle. (2 marks)

(i) Glomerulus

(ii) Loop of Henle

(f) Name two renal diseases (2 marks)

Test tube	Observation at start of experiment	Observation at the end of experiment
1		
2		
3		

KAHURO /KIHARU DISTRICT JOINT EXAMINATION
231/1
BIOLOGY
PAPER 1
(THEORY)
TIME: 2 HOURS

1. Name the branch of Biology that deals with the study of
(i) Microscopic organisms. (1 mark)
(ii) Fungi. (1 mark)
2. (a) Name the kingdom into which the prokaryotes are placed. (1 mark) (b) State two characteristics used to classify arthropods in classes. (2 marks)
(c) A certain plant had the following characteristics:

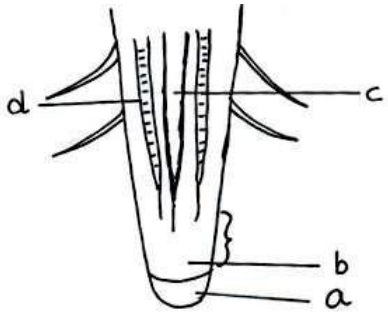
- Presence of roots, stem and leaves.
- Found with sori on the under surface.
- Life cycle in sporophyte and gametophyte generations.
- Sporophyte generation being dominant.

Name the division to which the plant belongs. (1 mark)

3. (a) Name **two** structures for gaseous exchange in aquatic plants. (2 marks)
(b) Explain why guards cells have thicker inner walls and thinner outer walls. (1 mark)

4. (a) Distinguish between homozygote and heterozygote. (2 marks)
(b) State **two** causes of variations. (2 marks)

5. State the functions of the following cell organelles.
(i) Nucleolus. (1 mark)
(ii) Centriole. (1 mark)
6. Name the causative agent of the following diseases. (2 marks)
(i) Cholera.
(ii) Candidiasis.
7. Define each of the following terms.
(a) Speciation. (1 mark)
(b) Natural selection. (2 marks)
(c) Divergent evolution. (1 mark)
8. (a) Study the diagram below and answer the questions that follow. (3 marks)



(i) Label parts: a,b and c

(ii) State function of part labelled **d**. (1 mark)

9. State **three** distinguishing features of mammalian rib bone. (3 marks)
10. Give **three** factors that determine the amount of energy a human being require in a day. (3 marks)
11. Name the antigens that determine human blood groups. (2 marks)
12. State the adaptation that enable red blood cell to move in blood capillaries. (1 mark)
13. (a) Give a reason why lumbar vertebrae have long and broad transverse processes. (1 mark)

(b) Which type of joint is found at articulation of pelvic girdle and femur? (1 mark)

14. Why is oxygen important in the process of active transport, (1 mark)
15. Study the reaction below.

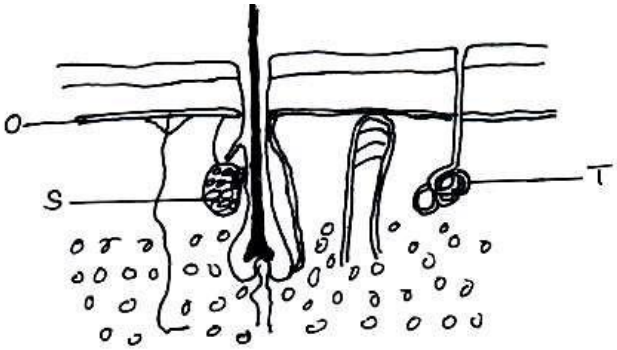
Hydrogen peroxide $\xrightarrow{X}$ water and oxygen.

(a) Name enzyme X. (1 mark)

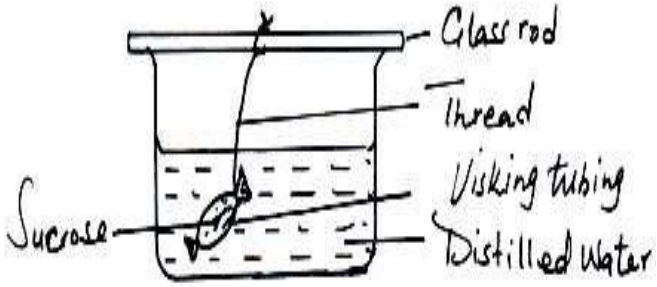
(b) Explain the importance of the above reaction in tissue of living organisms.(2 marks

16. Give a reason why staining is important when preparing specimen for observation by use of light microscope. (1 mark)

17. The diagram shows across section of mammalian skin.

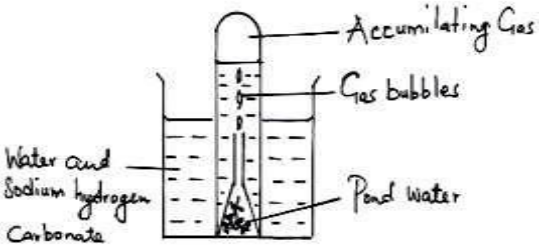


(a) Name parts T and S (2 marks)
(b) State the function of part labelled **S**. (1 mark)
18. State **two** processes that occur during anaphase of mitosis. (2 marks)
19. What is the significance of meiosis? (2 marks)
20. State the site of production of progesterone. (1 mark)
21. An experiment was set up as shown below.



The set up was left for 30 minutes.
(a) State the expected results. (2 marks)
(b) Explain the observation above. (2 marks)
22. How are leaves of submerged plants adapted for photosynthesis? (2 marks)

23. (a) The action of ptyalin stops at stomach explain. (1 mark
(b) State **two** factor that denatures enzymes. (2 marks)
(c) Name the features that increase the surface area of small intestine. (2 marks)
24. The apparatus below are used to investigate an aspect of photosynthesis.



(a) Name the aspect of photosynthesis being investigated. (1 mark)
(b) How can one verify the identity of the gas that accumulates in test tube? (1 mark)
(c) State the role of sodium hydrogen carbonate. (1 mark)
(d) What environmental factor are required in order to give positive results? (1 mark)

25. (a) Name **two** forms in which carbon (IV) oxide is transported in blood. (2 marks)

(b) What is tissue fluid? (1 mark)

26. How are the mitochondria adapted to their function? (2 marks)

27. State **three** structural differences between arteries and veins. (3 marks)

28. Name the hormone secreted by:-

(i) Thyroid glands. (1 mark)

(ii) Adrenal glands. (1 mark)

29. State the functions of the following parts of the ear.

(a) Eustachian tube. (1 mark)

(b) Cochlea. (1 mark)

(c) Ossicles. (1 mark)

(d) Semi circular canals. (1 mark)

30. Other than using quadrat method give two methods of estimating population of grass. (2 marks)

KAHURO /KIHARU DISTRICT JOINT EXAMINATION

231/2

BIOLOGY

PAPER 2

(THEORY)

TIME: 2 HOURS

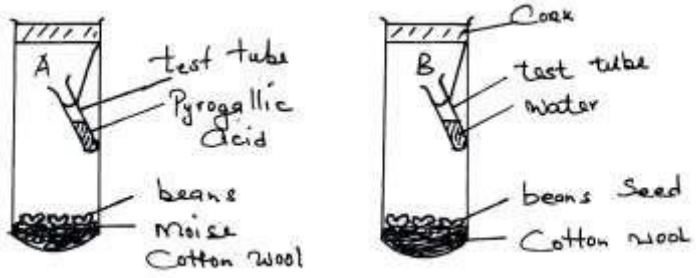
1. (a) Define the term sex linkage. (1 mark)

(b) Name **two** sex linked traits in man. (2 marks)

(c) In fruit flies (Drosophila melanongaster) inheritance of eye colour is sex linked. The gene for red eye is dominant.

Across was made between homozygous red eyed female and white eyed male. Work out the phenotypic ratio of F_1 generation. (Use R to represent gene for red eyes). (5 marks)

2. In an experiment a group of students set up the test tubes as shown below.



(a) What was the aim of the experiment? (1 mark)

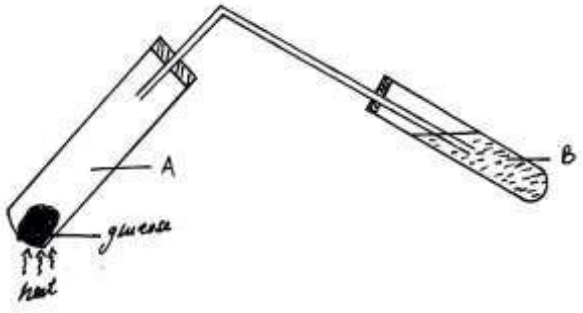
(b) Why was pyrogallic acid included in the gas jar **A**? (1 mark)

(c) What results would you expect in each of the gas jar **A** and **B** at the end of experiment? (2 marks)

(d) State **three** artificial ways of breaking seed dormancy. (3 marks

(e) Name **two** hormones that bring about rapid cell division in plants. (2 marks)

3. Students set up an experiment as shown below. Use it to answer the questions that follow.



(a) What was the aim of the experiment? (1 mark)

(b) What observation would be made in test tube **B**? (1 mark)

(c) Explain the results in (b) above. (1 mark)

(d) Write word equation for the process of anaerobic respiration in plants. (1 mark)

(e) State **four** application of anaerobic respiration. (4 marks)

4. (a) Define a

(i) fossil. (1 mark)

(ii) vestigial structures. (1 mark)

(b) Give **two** examples of vestigial structures in man. (2 marks)

(c) List **four** evidences of organic evolution. (4 marks)

5. Study the equation below and answer the questions that follow.

Amino acid + Amino acid $\underset{}{\overset{X}{\rightleftharpoons}}$ P + Water

(a) Name product **P**. Y (1 mark)

(b) Name the reaction represented by letter: X and Y (2 marks) (c) State the functions of the following enzymes. (3 marks) (i) Pepsin.

(ii) Salivary amylase. (iii) Enterokinase.

SECTION B:

6. In an ecological study a certain insect population and that of predators was estimated in a certain grassland over a period of 1 year (one year).

Month	J	F	MA	A	M	J	JU	A	S	O	N	D
No of insects	8	20	12	24	200	600	120	16	10	30	180	400

No of predator	10	8	2	4	16	30	10	4	2	2	5	20
Rainfall amount (mm)	20	6	55	350	500	250	12	10	25	190	240	30

(a) Using the information above plot on the same axis the graph of number of insects and number of predators against time in months. (7 marks)

(b) Suggest what happens to the insect's population during dry months. (2 marks)

(c) Explain the relationship between the insect population and that of predators. (3 marks)

(d) Suggest what happens to the predator's population during dry month. (2 marks)

(e) Name the trophic level occupied by:- (3 marks)

(i) Predator (ii) Insects

(iii) Grass

(f) Name the method used to estimate population of: (3 marks) (i) Predator (ii) Insects

(iii) Grass

7. (a) (i) State **two** significances of transpiration. (2 marks)

(ii) Discuss the forces involved in movements of water from roots to the leaves. (8 marks)

(b) Describe the mechanism of opening and closing of stomata using photosynthesis theory. (10 marks)

8. Describe the adaptation of mammalian eye to its functions. (20 marks)

KAHURO/KIHARU DISTRICT JOINT EXAMINATION

231/3

BIOLOGY

PAPER 3

(PRACTICAL)

CONFIDENTIAL:

Each candidate should be provided with:

- Orange 1 piece (E).
- D.C.P.I.P 5cm³.
- Benedicts – access to.
- Dilute HCl – access to.
- Sodium hydrogen carbonate – access to.
- Copper (II) sulphate – access to.
- Sodium hydroxide – access to.
- Scarpel.
- Means of heating – access to.
- Test tube holder.
- Dropper.

KAHURO /KIHARU DISTRICT JOINT EXAMINATION

231/3

BIOLOGY
PAPER 3
(PRACTICAL)
TIME: 1¾ HOURS

1. You are provided with Specimen E.
   (a) Identify the part of plant the specimen belongs. (1 mark)
   (b) Give reason for your answer in 1(a) above. (1 mark)
   (c) Cut a transverse section of the specimen E and draw and label the parts of the specimen. (5 marks)
   (d) Calculate the magnification of your drawing. (1 mark)
   (e) State the type of placentation shown in the above specimen. (1 mark)
   (f) (i) Name the mode of dispersal. (1 mark)
   (ii) Give reasons for d(i) above. (3 marks)
2. (a) Squeeze some juice from Specimen E to obtain juice E and use it to carry out food tests. Using the reagents provided.

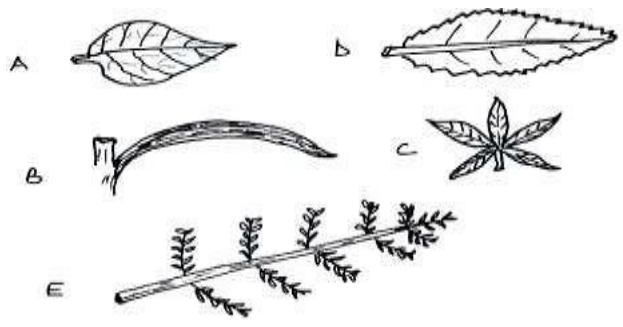
TEST	PROCEDURE	OBSERVATION	CONCLUSION

(12 marks)

(b) State the use of:

(i) Dilute hydrochloric acid. (1 mark)
(ii) Sodium hydrogen carbonate. (1 mark)

3. (a) The diagrams below shows leaves obtained from five different plants.



Using the key provided identify the plants from which the leaves were obtained in each case give the sequence of steps in the key which you followed to arrive at the identify.

1 (a) Leaf simple ---------- go to 2

(b) Leaf compound ---------- go to 4

2. (a) Leaf with parallel veins---------- Maize

(b) Leaf with network vein ---------- go to 3

3. (a) Leaf margin smooth ---------- Bou gainvillea (b) Leaf margin serrated ---------- Hibiscus

4. (a) Leaflets emerging from one stalk like fingers ---------- Bombax
(b) Leaflets emerging from several stalk attached to main stalk-------- Acacia

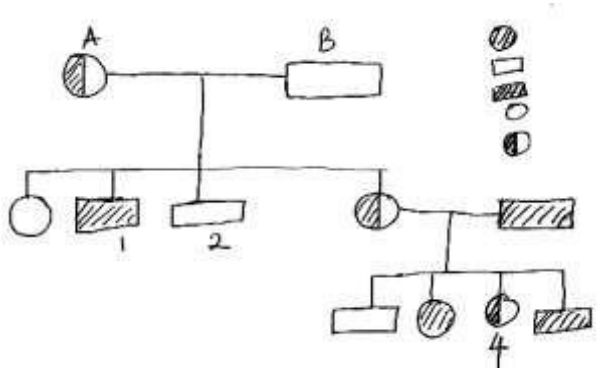
Leaf	Steps	Identity
A		
B		
C		
D		
E		

(10 marks)

(b) State **three** differences between the classes from which leaf A and leaf B were obtained from. (3 marks)

KURIA EAST SUB-COUNTY JOINT EXAMINATION COUNCIL
231/2
BIOLOGY
PAPER 2
(THEORY)
TIME: 2 HOURS

1. The Haemophilia is an sex-linked recessive condition. The following pedigree shows a portion of a family in which members have haemophilia. Use H for non-haemophilia and h for hemophilia.



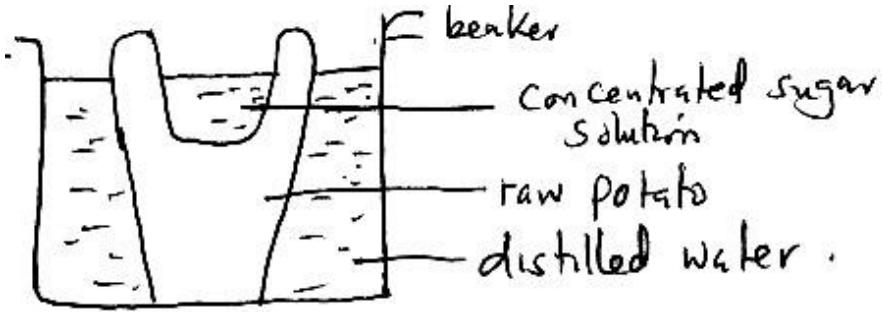
Key

Normal female

Normal carrier

a) Identify the genotype of parents A and B. (2 marks)
b) What is the genotype of offspring 1?. (1 mark)
c) A carrier woman marries a haemophilic man. What is the probability that, the couple will have a son who is haemophiliac?. Show your working. (4 marks)
d) Name **one** defect of non-disfunction chromosomal mutation. (1 mark)

2. The diagram below represents a set-up to investigate a certain physiological process.



After some time the level of sugar solution was observed to have risen.

a) What physiological process was being investigated. (1 mark)
b) Account for the rise in the level of sugar solution. (4 marks)
c) Suggest the result that would be observed if the experiment was repeated using a piece of boiled potato. (1 mark)

d) Define the following terms
   i) Crenation (1 mark)
   ii) Turgidity (1 mark)

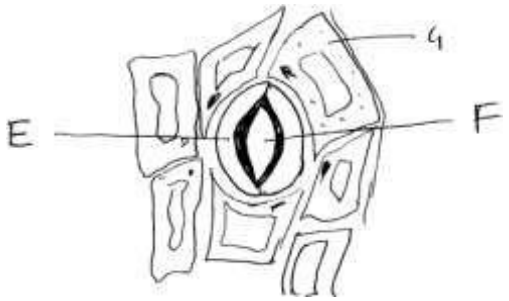
3. a) Give the differences between the following structures in wind and insect pollinated flowers. (6 marks)

PART	INSECT	WIND
Anther		
Stigma		
Pollen grain		

b) State **two** mechanism that hinders self pollination in flowering plants. (2 marks)

---

4. The diagram below represents epidermis of a leaf



a) Name the parts marked E, F and G (3 marks)
b) State **two** aspects of cell E that are an adaptation to its function. (2 marks)
c) Describe the changes that would take place in E if the cells were placed in concentrated sugar solution for a long period. (3 marks)

5. a) Name an enzyme that is found in the saliva of man and state its function. (2 marks) b) Give the function of the following organs in digestion. (2 marks) i) The Tongue ii) The oesophagus

c) State the PH in the following part of the digesive system. (3 marks) i) Mouth ii) Stomach iii) Duodenum
d) Define the term assimilation. (1 mark)

SECTION B

Answer question 6 (compulsory) and either question 7 or 8 in the spaces provided after question.

6. In an ecological study a grass hopper population and that of crows was estimated in a certain grass land area over a period of one year. The results are as s hown in the table below.

MONTH	J	F	M	A	M	J	J	A	S	O	N	D
No. of Adult Grasshopper $X10^2$	90	20	11	25	2500	1652	120	15	10	35	195	456
Number of Crows	4	2	1	1	8	22	7	2	1	1	5	15
Amount of rainfall	20	0	320	350	520	350	12	10	25	190	256	350

a) i) What is the relationship between the rainfall and grasshoppers population? (1 mark)

ii) Account for the relationship stated in a (i) above (3 marks) b) Explain the relationship between the grasshopper and the crows population. (3 marks)

c) If the data was used in the construction of pyramid of numbers, what would be the trophic level of: (3 marks) i) Grasshopper
ii) Crows
iii) The grass in the study area

d) If the area studied was on a square kilometer, state
i) One method that could have been used to estimate the grasshopper population. (1 mark) ii) One method that could have been used to estimate the crows population. (1 mark)

e) Suggest what would happen if a predator for grasshoppers entered the study area. (2 marks)

f) What is meant by the term carrying capacity? (1 mark)

g) Why would the carrying capacity of wild gazelles in woodland be higher than that of cattle. (2 marks)

h) What is ecosystem? (3 marks)

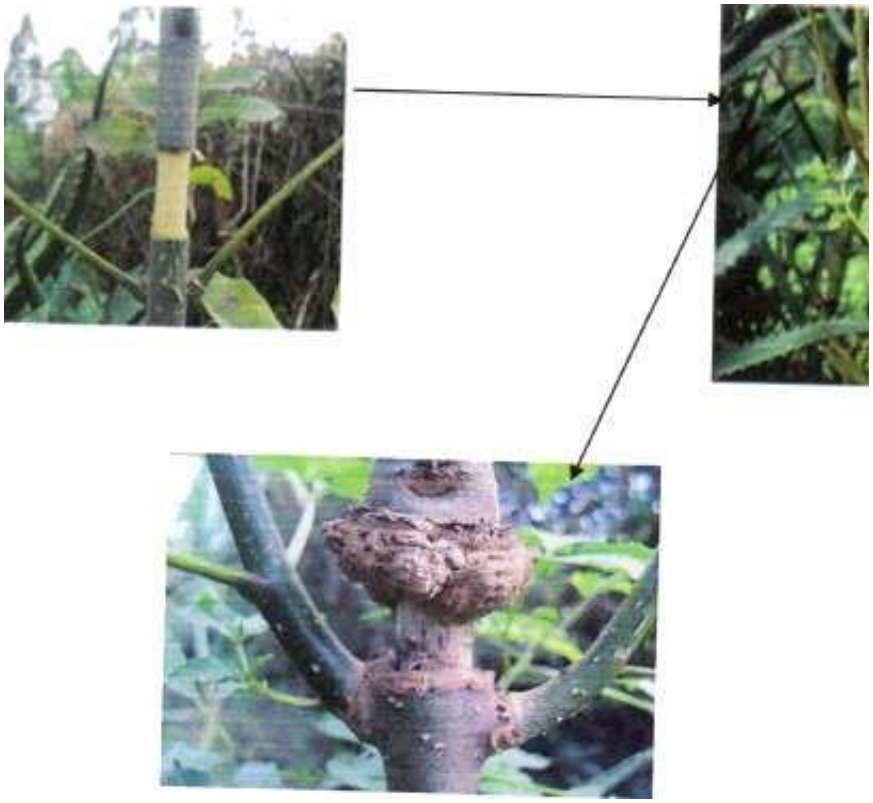
i) Name **three** climatic factors which are abiotic. (3 marks) 7. Describe how the human skin is adapted to its function. (20 marks)

8. a) Describe the characteristics and functions of the three types of muscle found in mammalian body. (10 marks)
b) Describe the influence of auxin on the shoot and root responses in seedling lying horizontally (10 marks)

KURIA EAST SUB-COUNTY JOINT EXAMINATION COUNCIL
231/3
BIOLOGY
PAPER 3
(PRACTICALS)
TIME: $1\frac{3}{4}$HOURS

a) Use the photograph of plant experiment to answer the quesations that follow.

1.



i) Name the process being investigated. (1 mark)

ii) Name the plant tissue involved in the physiological process illustrated above. (1 mark)

iii) Name the physiological process involved in the process illustrated above. (1 mark)

iv) How is the plant tissue named in 1 (a) (iii) above adapted to its function.

b) Study photographs C and D and answer the questions.

Photograph C

Photograph D



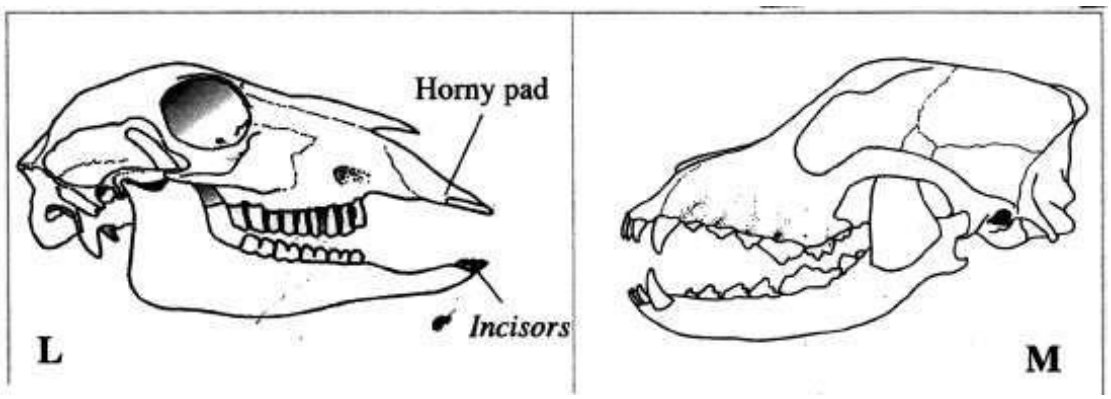


i) With a reason state the agent of pollination of each of the flowers. (4 marks)

ii) Classify the animal in photograph D using the taxonomic units below and reasons for your answer (4 marks)

Taxonomic unit	**Reason**
Phylum	
Class	

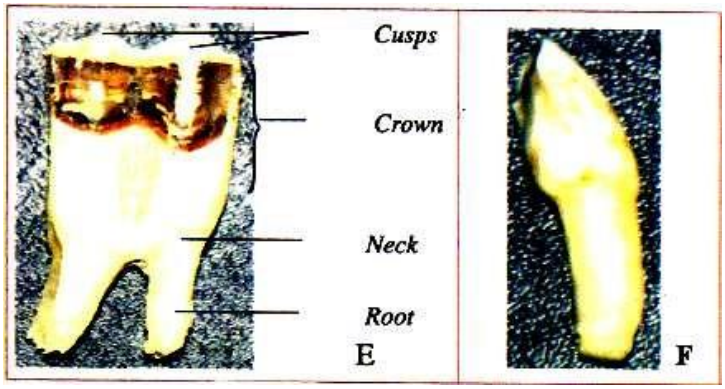
2. Below are photographs of specimen labelled L and M which were obtained from different animals. Examine them.



a) Suggest the diet of each of the animals whose skulls are shown in the diagram. Give reasons for your answer (6 marks)

b) Write the dental formula of the animal whose skull are shown in diagrams L and M. (2 marks)

c) Examine the following diagrams labelled E and F.



i) With reasons identify E and F

Identify E (1 mark)

Reasons (2 mks)

Identify F (1 mark)

Reasons (2 marks)

3. You are provided with a sample of food labelled P in solution form. Using the reagents, carry out tests on the food sample to identify the type of food substances present.
(12 marks)

Food substance	**Procedure**	**Observation**	**Conclusion**

1.

GATUNDU NORTH SUB-COUNTY JOINT MOCK EXAM

Kenya Certificate of Secondary Education.

231/1

BIOLOGY

PAPER 1

FORM FOUR

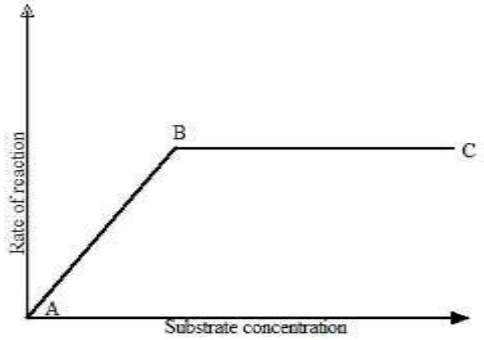
TIME:HOURS.

Answer all questions.

1. (a) What is the function of centriole in a cell? (1 mark)
   (b) Name a cell organelle that would be abundant in a skeletal muscle. (1 mark)

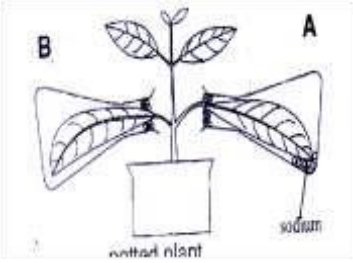
2. State the importance of osmosis in plants. (3 marks)
3. State **two** functions of saliva. (2 marks)
4. Describe what happens during the light stage of photosynthesis. (3 marks)

5. The graph below shows the effect of substrate concentration on the rate of enzyme controlled reaction.



   (a) Account for the shape of the graph between B and C. (2 marks)
   (b) State **two** other factors that affect the rate of enzyme reaction. (2 marks)
6. State **three** roles of active transport in the human body. (3 marks)

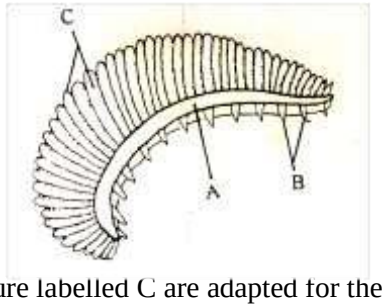
7. A student set up an experiment as shown below. Study the set-up and then answer the questions thatfollow.



Before setting the experiment, the potted plant was kept in darkness over night.
   (a) Explain the importance of keeping the plant over night before the experiment. (1 mark)
   (b) What was the role of sodium hydroxide in the experiment? (1 mark)

   (c) What were the expected results at the end of the experiment? (2 marks)
8. Name the;
   (a) Material that strengthen xylem tissue. (1 mark)
   (b) Tissue that is removed when the bark of the dicotyledonous plant is ringed. (1 mark)

9. The diagram below shows the structures of a gill of a fish.

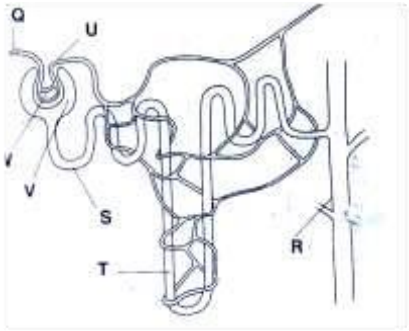


(a) State **three** ways the structure labelled C are adapted for the function. (3 marks)
(b) What is the function of structure labelled B? (1 mark)
(c) In a body of fish, water flows along the gill filament in a direction opposite that of the blood. (2 marks)

Explain the importance of this.

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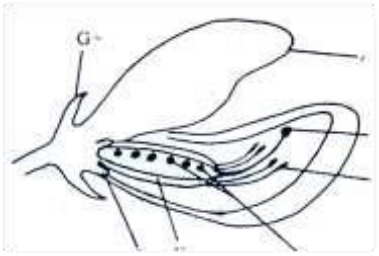
10. List **four** differences between aerobic respiration and photosynthesis. (4 marks)
11. Explain the role of vasodilation in thermoregulation. (3 marks)
12. Study the diagram below and then answer the questions that follow.



(a) Name the structures labelled S and R. (2 marks)
(b) When some pressure is applied at W, a fluid appears at V. Name the fluid formed at V. (1 mark)
(c) State the structural difference between structure labelled Q and the one labelled U. (1 mark)
13. A student collected a bone from the school garden. The bone was measuring 45 cm. He drew the bone in his book and his diagram was 9 cm long.
Calculate the magnification of his drawing. (2 marks)

14. (a) Distinguish between intarspecific and inter specific competition. (2 marks)
(b) What is the meaning of a phrase ―biological control of a population‖? (1 mark)
15. Explain why the number of predators in any ecosystem is always less than the number of preys. (2 marks)

16. The diagram below shows half a flower.



(a) Identify the structure that develop into a fruit wall after fertilization. (1 mark)
(b) Name the structure labelled B and F. (2 marks)
(c) What is the function of the structure labelled G? (1 mark)

17. (a) State **three** factors necessary for seed germination. (3 marks)
(b) Name the tissue responsible for secondary thickening in plants. (1 mark)

18. (a) State **three** effects of dumping untreated sewage into a river. (3 marks)
(b) Name **one** process that is responsible for loss of energy from one trophic level to the next. (1 mark)

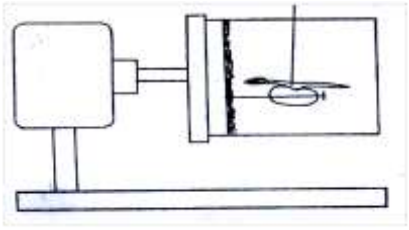
19. What is meant by;
(a) Adaptive radiation. (2 marks)
(b) Organic evolution. (2 marks)

20. State the functions of the following parts of the mammalian ear.
(a) Tympanic membrane. (2 marks)
(b) Ear ossicles. (2 marks)

21. State the function of each of the following parts of a neurone.
(a) Myelin sheath. (1 mark)
(b) Node of Ranvier. (1 mark)

22. The diagram below shows a bean seeding pinned in a klinostat. Study the diagram and then answer the questions that follow.

seedling



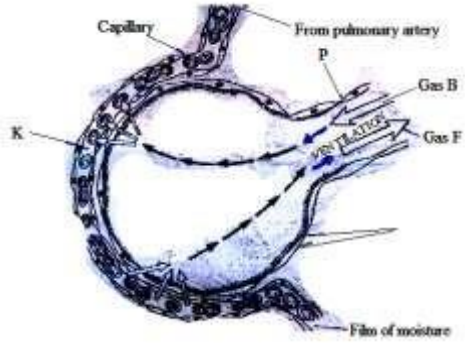
Account for the observation made after 48 hours with the klinostat moving. (4 marks)

23. State **four** functions of bones in mammals. (4 marks)
24. Name **three** meristems in woody plants. (3 marks)

231/2
BIOLOGY
PAPER 2
JULY / AUGUST
TIME:2 HOURS.

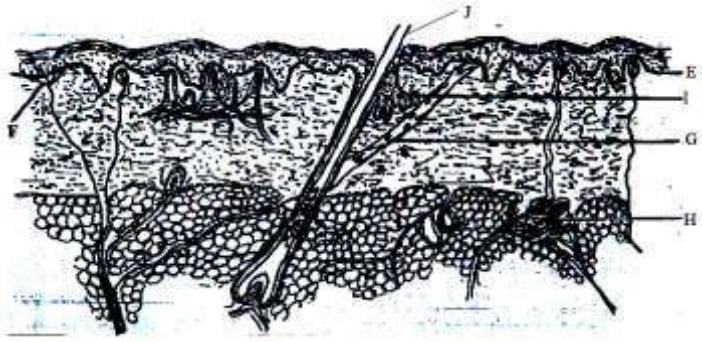
SECTION A
Answer all questions in this section in the spaces provided.

1. The diagram below shows the exchange of gases in the alveolus. Study it and answer the questions that follow.

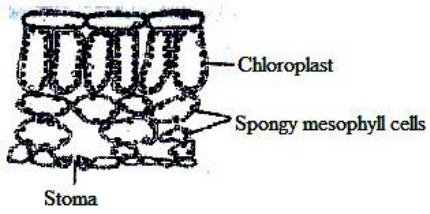


(a) Name the gases named F and B. (2 marks)
(b) State the importance of the gas marked B in the tissue. (1 mark)
(c) Name the parts marked K and P. (2 marks)
(d) State the adaptations of the alveolus to its function. (3 marks)

2. In a family with four children three were found to have normal skin pigmentation while one was an albino. Using letter A to represent gene for normal skin pigmentation and a to represent the gene for albinism.
(a) What are the possible genotypes of the parents? (1 mark)
(b) Work out the genotypic ratio of their children. (5 marks)
(c) Apart from albinism, name **two** disorders that are genetically inherited in human beings. (2 marks) 3. The diagram below shows a section through the mammalian skin.



(a) Name the parts labelled E, F, G and J. (4 marks)
(b) State **two** functions in each case of the substances secreted by the structures labeled; H and I (4 marks) 4. (a) The figure below shows a section through a leaf. A leaf is designed for photosynthesis and this process provides a supply of simple sugars for a plant.



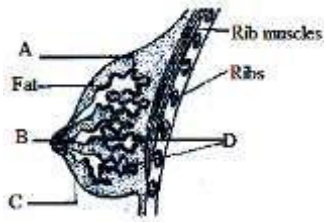
(i) State the function of the chloroplasts in photosynthesis. (1 mark)
(ii) Explain the advantage of the distribution of the chloroplasts as shown in the figure above. (2 marks)
(iii) Suggest the function of the stomata and the spaces between spongy mesophyll cells in the process of photosynthesis. (1 mark)

(b) (i) Name the tissue that transports the sugars made by photosynthesis to other parts of the plant. (1 mark)

(ii) Name the mineral ion that is used to form proteins. (1 mark)

(c) Explain the effect of light on the opening of the stomata. (2 marks)

5. The diagram below shows a section through the human breast during lactation.



(a) (i) Identify each of the part labelled A and B. (1 mark)
(ii) State functions of the part labelled C and D. (2 marks)
(b) (i) Define the term lactation. (2 marks)
(ii) Explain how lactation is initiated within the mammary glands. (3 marks)

SECTION B

Answer question 6 (compulsory) in the spaces provided and either number 7 or 8 in the spaces provided after question 8.

6. An experiment was carried out to investigate the population growth of organisms under laboratory conditions. The procedure was as follows. Twenty young mice were placed in a cage. The amount of available food to the mice each day was kept constant. The results obtained were as shown below.

Time in months	0	2	4	6	8	10	12	14	16	18
Number of mice	20	20	65	115	310	445	450	190	145	160

(a) Using a suitable scale plot a graph of number of mice against time. (6 marks)
(b) With reference to the graph account for the changes in mice population between;
(i) 0 - 2 months. (2 marks)
(ii) 2 - 10 months. (2 marks
(iii) 12 - 16 months. (2 marks)
(c) Between which **two** months was population change greatest? (2 marks)
(d) Calculate the rate of population change over the period you have named in (c) above. (2 marks)
(e) After the experiment some mice were fed to a snake near a laboratory. After some months the snake was found dead nearby. On analysis it was found out that its blood had an abnormal accumulation of a chemical X which was in small amount in the food the mice ate.
Explain why the snake died and not the mice. (2 marks)

(f) List **two** density dependant factors that affect population growth in an ecosystem. (2 marks)

7. (a) State **three** defects of the eye and how each can be corrected. (6 marks)

(b) How are the structures of the human eye adapted to their functions. (14 marks)

8. (a) Explain how terrestrial plants are adapted to deal with problems of transpiration. (10 marks)
(b) Explain the causes of seed dormancy. (10 marks)

GATUNDU NORTH SUB-COUNTY JOINT MOCK EXAM

Kenya Certificate of Secondary Education.

231/3
BIOLOGY
PAPER 3
(PRACTICAL

CONFIDENTIAL

1. Supply each student with the following;
   - Benedict's solution about 20 ml. - Iodine solution about 20 ml - 5 clean test tubes in a rack.
   - Access to means of heating (can be shared) - A test tube holder.
   - 2 droppers.
   - Visking (dialysis) tubing - about 9 cm
   - A thread about 20 cm
   - An empty beaker (100 ml)
   - Measuring cylinders (can be shared) (250 ml cylinder) - About 80 ml solution Y.
   - About 40 ml solution X.
   - Distilled water.

NB/ Solution X is distilled water.

Solution Y - Dissolved 20 gm of starch in warm water and stir completely. Add about 50 mg of glucose in 100 ml of distilled water.

2. No requirement.
3. No requirement.

GATUNDU NORTH SUB-COUNTY JOINT MOCK EXAM 2015
Kenya Certificate of Secondary Education.
231/3
BIOLOGY
PAPER 3
(PRACTICAL) JULY /
AUGUST 2015 $1\frac{3}{4}$
HOURS.

1. You are provided with liquids labelled X and Y. Spare about 10 ml of X and 50 ml of Y for part (b) of this question.

(a) Using reagents provided carry out food tests for food substances in liquid X and Y. (6 marks)
Record your observation in table (I) below.
Table I

Liquid	Food substance Procedure	Observation	Conclusion
X			
Y			

(b) Using a thread, the one end of the visking tubing, open the other end of the tubing and half fill it with liquid X. Tightly tie the other end ensuring that there is no leakage in both ends. Immerse the tubing in the beaker containing liquid Y. Leave the setup for atlease 30 minutes.
After 30 minutes remove the tubing from the beaker thoroughly wash the outside of the tubing to remove all traces of liquid Y. Using reagents provided carry out food tests in liquid X. In the visking tubing.

Record your observation in the table below. (2 marks)

Table II

Liquid	Food substance Procedure	Observation	Conclusion
X			

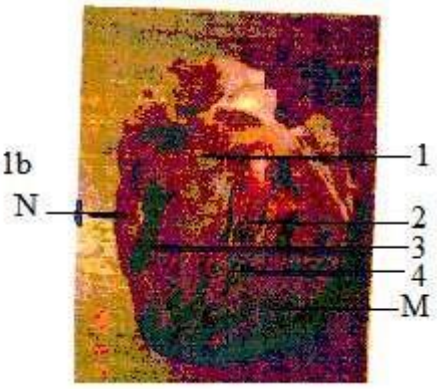
(c) (i) Name the physiological process being demonstrated by this experiment. (1 mark)
(ii) State any **two** parts of a human body where the above named physiological process takes place. (2 marks)
(iii) Account for the observation in table (II) above. (3 marks)

2. Study the photographs of organs in mammalian circulatory system and answer the questions that follow.

Photograph 2. 1a



Photograph 2. 1b



(a) Identify the organ whose photograph appears in 2.1. (1 mark)

(b) Name the tissue marked W in the photograph 2.1a and state its function.

Tissue W. (1 mark) Function. (1 mark)

(c) The photograph 2.1b is a longitudinal section of organs in photograph 2.1a. Observe it and answer the questions that follow.

(i) Name the parts marked 1, 2, 3, 4 and 4. (4 marks)

(ii) Compare the thickness of arts marked M and N in photograph 2.1b and explain the difference. (2 marks)



(d) Photograph 2.2 shows blood vessels labelled 5 and 6. Examine them carefully and answer the questions below.

(i) Identify blood vessels labelled 5 and 6. (2 marks)

(ii) State any **two** observable differences between blood vessels 5 and 6. (2 marks)

3. Use the photographs on plant responses to stimuli to answer the questions that follow.

The photograph shows various phenomena.

(a) (i) Sate the type of response shown, the seedlings in photograph G.. (1 mark)



(ii) Explain the mechanism of the response shown in question 3(i) above. (5 marks)

(b) (i) Using observable features only compare the seedlings in photograph G and H. Record their differences in the table below. (3 marks)

Photograph G	Photograph H

(ii) State the biological phenomenon shown by seedling in photograph H. (1 mark)

(c) State the type of germination exhibited by seedlings in photograph I. Give reasons.



Photograph I

Type of germination. (1 mark) Reasons. (2 marks)

KANGEMA/MATHIOYA FORM FOUR JOINT EVALUATION

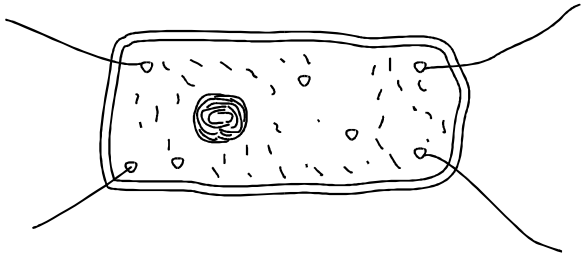
Kenya Certificate of Secondary Education

BIOLOGY

Paper - 231/1

Time: 2 hours

1. The diagram below represents a bacterium cell.



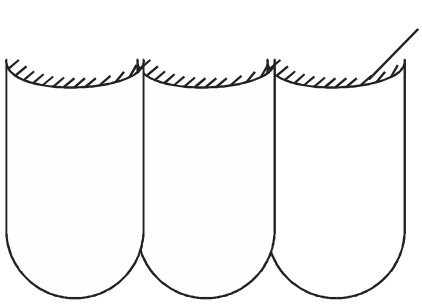
a) Name the kingdom to which the bacterium belong. (1 mark)

b) State two distinguishing characteristics of the members of the kingdom named above. (2 marks)

2. a) Name one element found in proteins but not not in carbohydrates. (1 mark)

b) State TWO functional roles of proteins in the body. (2 marks)

3. The diagram below shows a type of epithelial tissue.



a) State the possible functions of the hair-like processes on the tissue. (1 mark)

b) Name two mammalian organs where this type of epithelium is found. (2 marks)

4. State the major role of the following features of the mammalian vertebra.

i) Odontoid process. (1 mark) ii) Neural canal. (1 mark) iii) Vertebraterial canal (1 mark)

5. a) In which phase of photosynthesis are carbohydrates formed? (1 mark) b) Explain the biological disadvantage of growing some aesthetic plants in the living rooms. (2 marks)

6. A certain organ K was surgically removed from a rat. It was later found that there was a drastic increase in glucose level in the blood. When substance Q was injected into the animal the glucose in the blood went back to normal. Identify

i) Organ K (1 mark) ii) Substance Q. (1 mark)

7. When the tip of a plant is cut, lateral branches develop.

a) What name is given to this phenomenon? (1 mark)

b) Which plant hormone is responsible for the phenomenon above. (1 mark)

8. The table represents certain aspects of the circulatory system in certain animals. Fill in the missing spaces. (3 marks)

Heart	No. of atrium	No. of ventricles	Type of circulation
A	2	2	
B	2	1	

C	1	1	

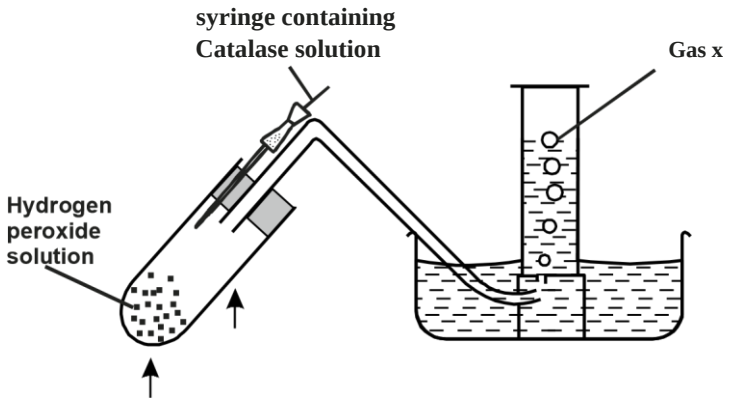
9. Name the tissue that carry out the following functions in mammals.

a) Binds and supports various organs in the body. (1 mark)

b) Transport oxygen throughout the body. (1 mark)

c) Contract and relax to bring about movement. (1 mark)

10. The apparatus shown below was set up by form two students in a certain school.



a) Name the gas X. (1 mark)

b) Write a word equation for the reaction which produces the gas. (1 mark)

c) Where in the human body does this type of reaction occur. (1 mark)

11. a) ..... is the basic unit of the DNA (1 mark)

b) Explain why it is genetically unwise for sisters to marry brothers or father to marry their daughters. (3 marks)

12. The diameter of the field of view of a microscope was found to be 6mm. There were 8 cells across the diameter of the field of view.

a) Calculate the size of one cell in micrometer. (2 marks)

b) State the difference between an electron microscope and a light microscope . (2 marks)

13. a) Name the components of the enamel of teeth. (2 marks) b) Name the diseases of the teeth characteristics by

i) Formation of cavities in the teeth. (1 mark)

ii) Gums become soft and flabby and bleeding of the gums occur. (1 mark)

14. a) Name three defects of the eye. (3 marks)

b) Which structure in the ear detect:

i) Change in posture (1 mark) ii) Sound waves. (1 mark)

15. What is the importance of a pooter to an ecologist? (1 mark)

16. The red blood cells lack mitochondria.

a) How is this advantages to red blood cells? (1 mark)

b) Apart from the reason stated above, give one other reason. (1 mark)

c) State two other characteristics of the red blood cell. (2 marks)

17. If a solution of 0.9% salt solution is isotonic to a certain type of animal cell, explain what happens when the animal cell is placed in a solution of 1.2% salt solution. (3 marks)

18. Two glucose molecules combine to form the disaccharide sucrose. The moleculer formula of glucose is $C_6H_{12}O_6$ while a single sucrose molecule has the molecular formula $C_{12}H_{22}O_{11}$. Account for the observation. (3 marks)

19. How is the dark stage of photosynthesis dependent to light stage. (2 marks)

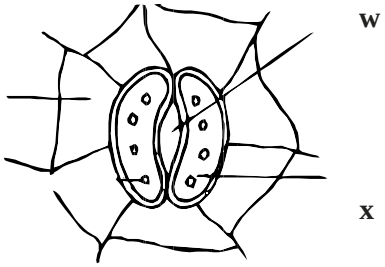
20. A horse has 64 chromosomes in its somatic cells while a donkey had 62. A mule is produced when a horse mates with a donkey. However a mule is sterile.

a) Work out the number of chromosomes in a mule. Show your working. (2 marks)
b) Why is the mule sterile? (1 mark)

21. Name the three processes that takes place in the liver to bring about difference in composition of blood in hepatic portal vein and hepatic vein. (3 marks)

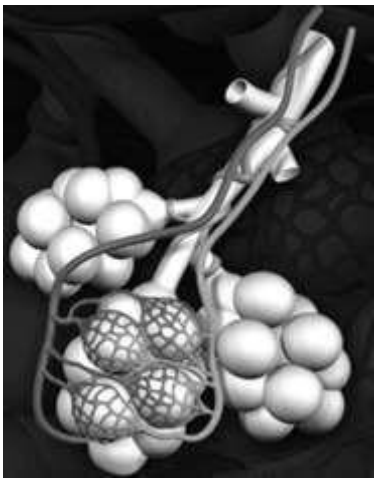
22. Explain why the rate of transpiration is reduced when humidity is high. (1 mark)

23. The diagram below shows part of the plant tissue.



a) Name the cell labelled X and part labelled W. (2 marks)
b) State two adaptations of cell labelled X to its function. (2 marks)

24. The diagram below represents part of a mammalian respiratory system.

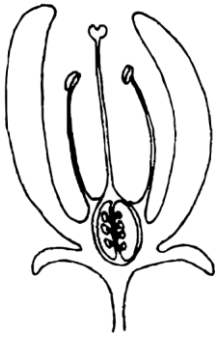


a) Name the structure. (1 mark)
b) State two observable ways in which the structure is suited to its function. (1 mark)

25. a) Define Eutrophication. (1 mark)

b) List two effects of Eutrophication in aquatic ecosystem. (2 marks)

26. Below is a simplified diagram of a flower.



i) Suggest its agent of pollination. (1 mark) ii) Name the type of ovary shown above. (1 mark) iii) Explain one observable mechanism that will hinder self pollination and fertilization in the above flower. (1 mark)

27. State two functions of muscles found in the reproductive system in females. (2 marks)

KANGEMA/MATHIOYA FORM FOUR JOINT EVALUATION

Kenya Certificate of Secondary Education

BIOLOGY

Paper - 231/2

Time: 2 hours

SECTION A : (40 marks)

Answer ALL the questions in this section in the spaces provided.

1. a) State four adaptive features that make schistosoma a successful endoparasite. (4 marks)

b) Name the disease caused by the schistosoma. (1 mark)

c) Complete the table below which shows some parasites and the disease they cause. (3 marks)

	Parasite	**Disease**
i)		Malaria
ii)		Cholera
iii)	Entamoeba histolytica	

2. a) What is mutation? (1 mark)

b) Explain why certain bacteria and other pathogens become resistant to drugs after sometime. (2 marks)

c) Work out a cross between a haemophilic man married to a carrier woman for haemophilia. (4 marks)

d) State the phenotypic ratio of the children. (1 mark)

3. a) What problems are experienced by fresh water and marine fish in their habitats. (2 marks) b) Compare how the fresh water and marine fish overcome the problem identified above. (4 marks)

c) Explain why a person discharge urine more often when the environmental temperature are low than when they are high.

(2 marks)

4. A group of students set up the following experiments to investigate the factors that affect enzymes

Tube 1	Tube 2	Tube 3	Tube 4
Egg white Amylase / ptyalin at 36°C	Boiled starch dilute acid Amylase 36°C	Boiled starch amylase 36°C	Boiled starch amylase 60°C

a) Identify the property of enzymes being investigated in tubes 1 and 2. (2 marks)

b) After 3 hours the students tested the content in the four tubes for starch. They obtained the following results in tube 2, 3 and 4.

Tube 2 - Blue-black colour

Tube 3 - Brown colour of iodine remained

Tube 4 - Blue black colour.

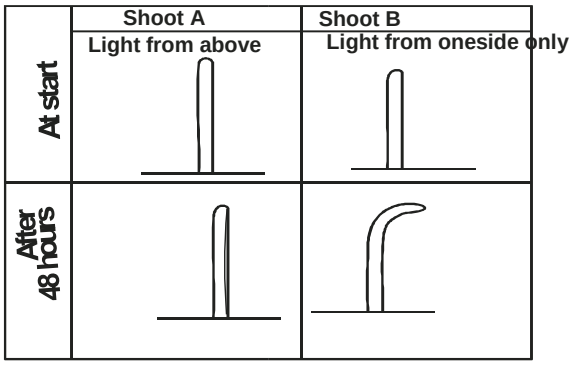
Account for the results obtained in tube 3 and 4. (2 marks)

c) What results would you expect in tube 3 if temperature was maintained at 5°C? Give a reason for your answer. (2 marks)

d) Name three enzymes found in the pancreatic juice. (3 marks)

5) In an investigation, young plant shoots were exposed to 48hrs of light from above or from one side only. Their growth responses are shown in the diagrams below.

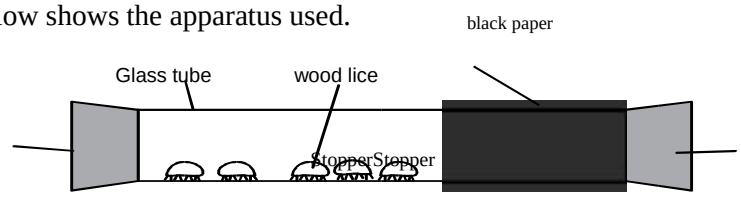
i) Name the response shown by the shoots and explain the advantages of this response to the plants. (1 mark)



ii) Account for the growth response of **shoot B** after 48 hours.

b) An experiment was set up to study the response of woodlice to light. Ten woodlice were placed in a glass tube. After five minutes one end of the tube was covered with black paper to make it dark. The number of woodlice in light and dark was then recorded every minute for five minutes.

The diagram below shows the apparatus used.

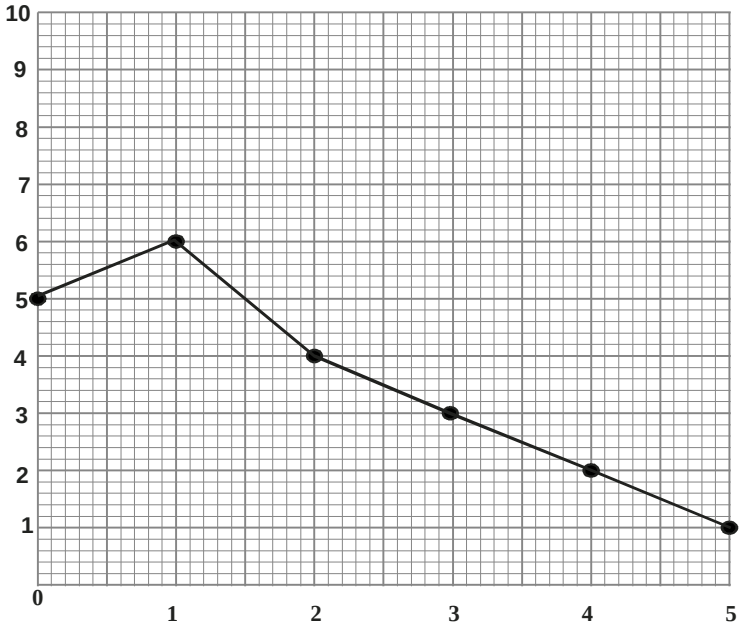


The table below shows the results of the experiment.

Time		0	1	2	3	4	5
Number of woodlice	In light	5	6	4	3	2	1
	In darkness	5	4	6	7	8	9

i) Why were the woodlice left there for five minutes before the pack paper was placed on the tube? (1 mark) ii) Complete the line graph on the grid below to show the number of woodlice found in the dark at each minute during the

experiment. The results for woodlice in light have already been plotted. (1 mark)



iii) State a conclusion which can be drawn from the results of this experiment.
(1 mark) **c)** A student repeated this experiment.

i) How could the design be changed to make the results more reliable?
(1 mark) ii) State one environmental factor which would be kept the same to allow a valid comparison with the first experiment.

(1 mark)

SECTION B (40 marks)

Answer question 6 (COMPULSORY) and either question 7 or 8 in the spaces provided after question 8.

6. The percentage germination of certain seeds at different temperature was determined as follows.

Temperature (°C)	0	10	20	30	40	50
% germination	0	30	40	90	2	0

a) Using a suitable scale plot a graph of % germination against temperature
b) ccount for % germination at
i) 0°C (1 mark) ii) 30°C (2 marks) iii) 50°C (1 mark)

c) What is seed viability. (2 marks)
d) State the factors that determine seed viability. (4 marks)
d) How can seed dormancy be broken. (4 marks)

7. a) Discuss gaseous exchanged in alveolus. (8 marks) b) Describe the process of exhalation in mammals. (8 marks)

c) Discuss the characteristics of gaseous exchange sites in an animal. (4 marks)

8. Define

i) Chewing evolution. (2 marks) ii) Organic evolution. (2 marks)

b) Giving examples give and account for any five pieces of evidence for organic evolution. (16 marks)

KANGEMA/MATHIOYA FORM FOUR JOINT EVALUATION

Kenya Certificate of Secondary Education
BIOLOGY

Paper - 231/3
July/August 2015 Time:
1¾ hours

1. You are provided with two specimens K1 and K2. The two specimens are similar except that they are at different stages of development.

a) i) Name the plant part represented by the specimens. (1 mark) ii) Give one reason for your answer. (1 mark) **b)** i) State two differences between K1 and K2. (1 mark) ii) Name the hormone responsible for the differences in b(i) above. (1 mark)

c) Cut a 20mm disc of K1 and place it in a pestle. Chop it into pieces and add 100ml of distilled water. Continue crushing and add a further 5ml of distilled water. Using a strainer, filter off the solution and label the filtrate as solution K1. Rinse the mortar and pestle thoroughly. Repeat the same procedure with K2 and label the resultant solution as K2. In K1 filtrate add

some particles. (10 marks)

FOOD SUBSTANCE	PROCEDURE	SOLUTION	OBSERVATIONS	CONCLUSION

2.a) Construct a dichotomous key to key out the following organisms using the following steps (8 marks)



P. velatus



S. gigan



S. coleopata



C. sapidus



S. gregaria

Step 1: Body covering

Step 2: Animal with 3pairs of walking limbs or more

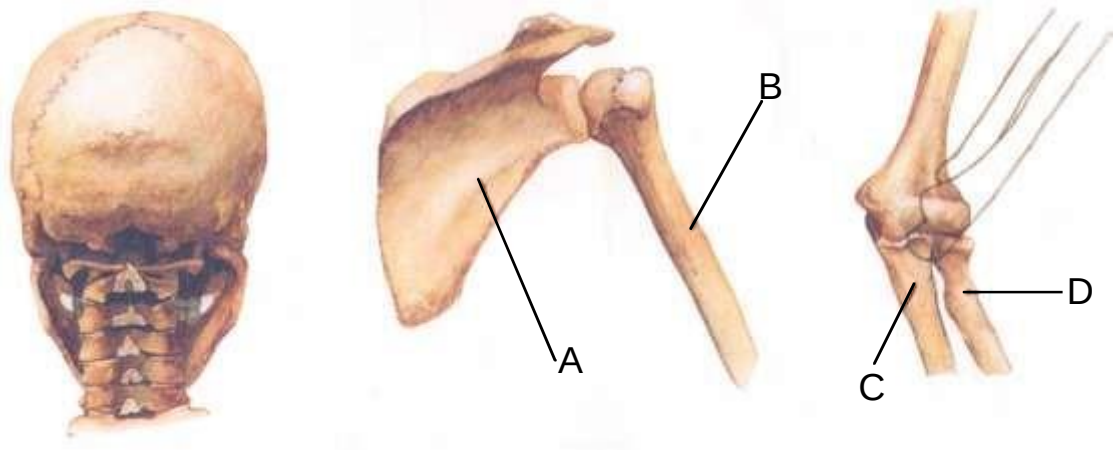
Step 3: Animals with four pairs of legs

Step 4 : Number of walking limbs per segment.

b) With reasons state the class to which the organisms belong.

i) S. gregaria (2 marks) ii) S. coleopata

3. Use the photographs below to answer the question which follow.



a) Name four types of joints found in the photographs. (4 marks)

b) Name the bones labelled A, B and C. (4 marks) c) Name the cavity where

i) bone B fits into bone A. (1 mark) ii) bone B fits into bone C and D. (1 mark)

d) i) Name the fluid which is found in the joint area of two bones. (1 mark) ii) State the function of the fluid named above. (1 mark)

MURANG'A SOUTH SUB-COUNTY MULTILATERAL EXAMINATION
KENYA CERTIFICATE OF SECONDARY EDUCATION

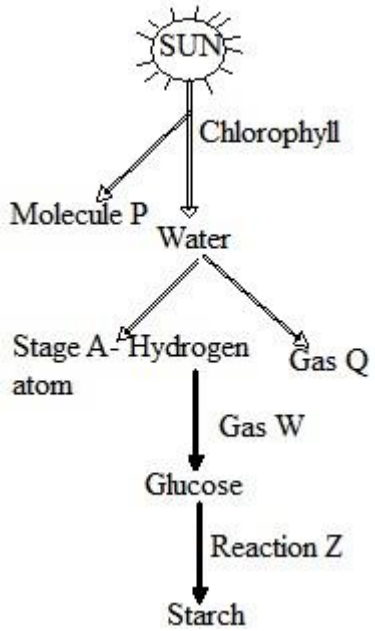
231/1
BIOLOGY
PAPER 1
FORM FOUR
TIME: 2 HOURS.

Answer all questions.

1. (a) Name the cell organelle which forms spindle fibres during cell division. (1 mark)
   (b) Other than the function given in (a) above, state one other function of the organelle. (1 mark)
2. (a) State **three** characteristics of a wind pollinated flower. (3 marks)
   (b) Explain why sexual reproduction is important to organisms. (2 marks)
3. Name the disease caused by the following parasite.
   (i) Salmonella typhi (1 mark)
   (ii) Entamoeba histolytica (1 mark)
4. The equation below represents a type of respiration.

$C_6H_{12}O_6 \longrightarrow 2C_3H_6O_3 + Energy$

   (a) Identify the type of respiration. (1 mark)
   (b) Suggest **one** industrial application of the process named in (a) above. (1 mark)
5. Below is a diagrammatic summary of the main biochemical events in photosynthesis. Study itcarefully and answer the questions that follow.



(a) Suggest the identity of molecule P. (1 mark
(b) Name the gas represented by letter W. (1 mark)
(c) Name the specific site for the reactions in stage A. (1 mark)
(d) Name reaction Z. (1 mark)

6. The reaction represented by the equation below occurs in the body.

$$\text{Hydrogen peroxide} \xrightarrow{\text{Enzyme Y}} \text{Oxygen + Water}$$

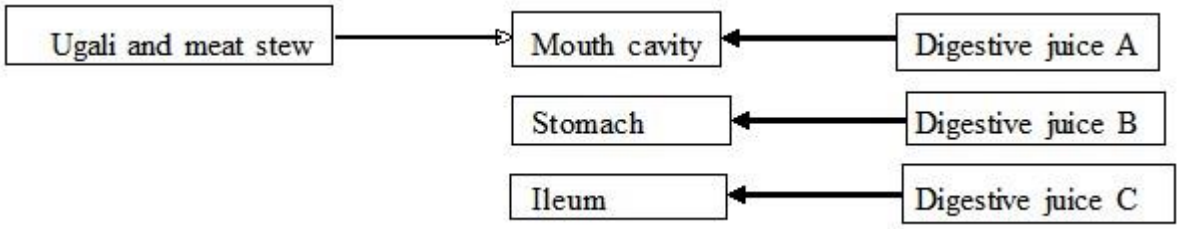
(a) Name enzyme Y. (1 mark)
(b) Name an organ in the body where the reaction mainly occur. (1 mark)
(c) What is the significance of the reaction? (1 mark)

7. (a) Name **two** disorders in man that occur through gene mutation. (2 marks)
(b) Give **two** advantages of polyploidy in plants. (2 marks)

8.Define the terms.

(i) Organic evolution. (1 mark)
(ii) Vestigial structures. (1 mark)
(iii) Natural selection. (1 mark)

9. The diagram below represents passage of a metal through the human digestive system Study the diagram and answer the question that follow.



(a) Name the physical process that will occur in the mouth cavity. (1 mark)
(b) Name the digestive juice C. (1 mark)
(c) Name the gland that secrete digestive juice B. (1 mark)

10. State **three** external differences between Chilopoda and diplopoda. (3 marks)

11. State the name given to;
(a) Study of chemical compounds and the reaction they take part in. (1 mark)
(b) Study of micro-organisms. (1 mark)

12. The table below shows the energy use per day in kilojoule.

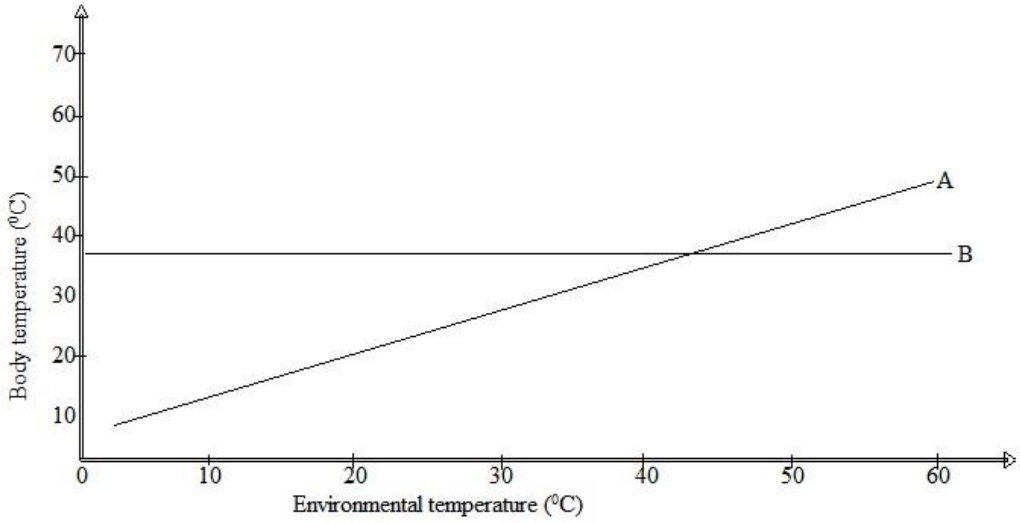
Age (years)	Males	Females
2	5,500	5,500
5	7,000	7,000
8	8,800	8,000
11	10,000	9,200
14	12,500	10,500
18	14,200	9,600
25	12,100	8,800

(a) From the table, explain why after age 8 males require more energy than females. (1 mark) (b) Other than sex and age, name three other factors that determine energy requirements in human being. (3 marks)

13. What is meant by the following terms?

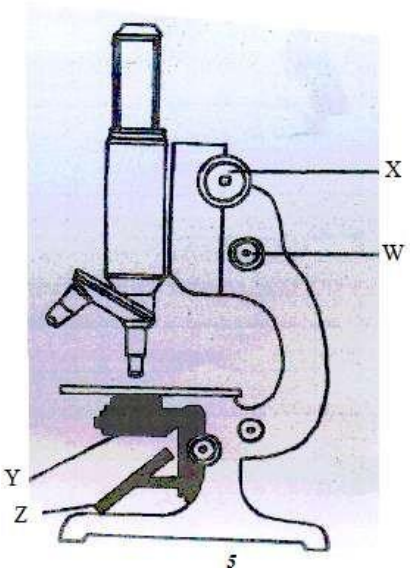
(a) Habitat. (1 mark)
(b) Ecosystem. (1 mark)

14. The graph below shows the relationship between environmental temperature and the body temperature in two different animals A and B.



(a) State the relationship between the body temperature of animal A and external environmental temperature. (1 mark)
(b) Give the term used to describe;
(i) Animals of type shown by graph A. (1 mark)
(ii) Animals of type represented by graph B. (1 mark)

15. The diagram below represents a common laboratory equipment.



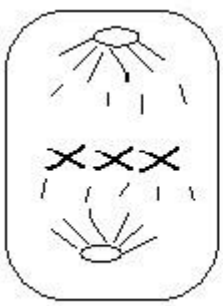
(i) Identify the equipment. (1 mark)
(ii) What is the function of part labelled W? (1 mark)
(iii) Using arrows show how the object is illuminated. (2 marks)

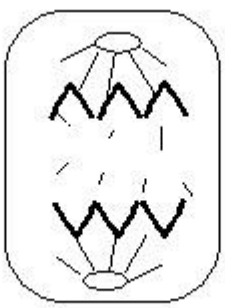
16. State **three** differences between osmosis and active transport. (3 marks)

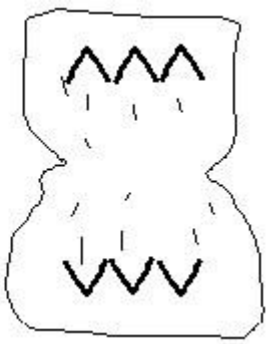
17. In the body cells of all organisms chromosomes occur in pairs. Members of each pair have a characteristic length and shape.

(a) What is the scientific name of such chromosome pair? (1 mark)
(b) What name is given to a cell that contains one member of each pair of chromosomes? (1 mark)
(c) Name the part in human females where meiosis take place. (1 mark)

18. The diagram below represents some stages in mitosis.

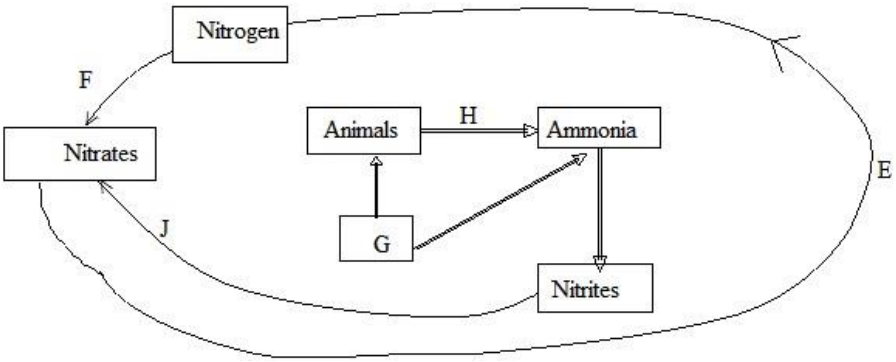






(a) Name the stages represented by the diagrams labelled A, B and C. (3 marks)
(b) Name **one** region in higher plants where cells actively undergo mitosis. (2 marks)

19. The diagram below represents a simple nitrogen cycle.



(a) Name the organisms that cause process E and J. (2 marks)
(b) Name the process represented by F and H. (2 marks)

20. What is meant by the terms;
    (i) epigynous flower (1 mark)
    (ii) staminate flower. (1 mark)

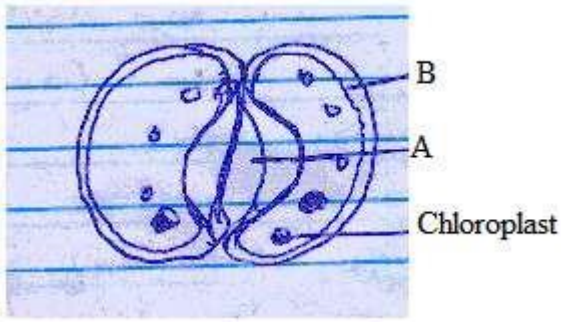
21. In an experiment, it is observed that when maggots are exposed to light, they move to dark areas. On the other hand, Euglena and Chlamydomonas move towards light.
    (i) Name the type of response exhibited by the maggots. (1 mark)
    (ii) state one advantage of the response shown by Euglena and Chlamydomonas. (1 mark)

22. (a) When corpus luteum breaks down prematurely during pregnancy, miscarriage is likely to result. Explain. (2 marks) (b) State the role of the following hormones during lactation in mammals. (2 marks) (i) Oxytocin. (ii) Prolactin.

23. Explain the absence of fibrinogen in urine yet it is present in blood plasma. (1 mark)

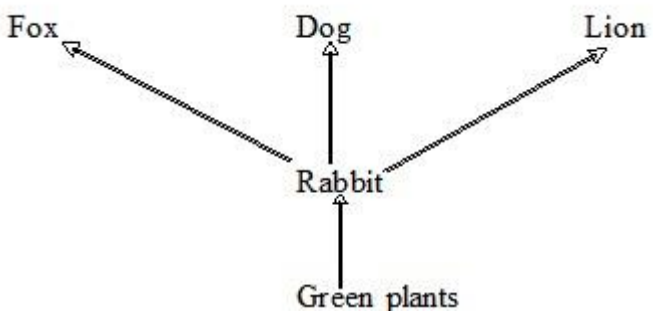
24. (a) State **two** roles of water in seed germination. (2 marks)
    (b) Define apical dominance. (1 mark)

25. Use the diagram of the stoma below to answer the questions that follow.



    (a) Identify parts labelled A and B. (2 marks)
    (b) State the functions of the structure shown in the diagram above. (1 mark)

26. The diagram below shows part of a food relationship in an ecosystem.



(a) Name the food relationship above. (1 mark)
(b) How many trophic levels are shown in the diagram above. (1 mark)
(c) Name one primary consumer in the food relationship above. (1 mark)
(d) State the main source of energy in the ecosystem. (1 mark)
27. State **one** way by which plants compensate for lack of locomotion. (1 mark)

MURANG'A SOUTH SUB-COUNTY MULTILATERAL EXAMINATION

KENYA CERTIFICATE OF SECONDARY EDUCATION
231/2
BIOLOGY
PAPER 2
TIME: 2 HOURS.

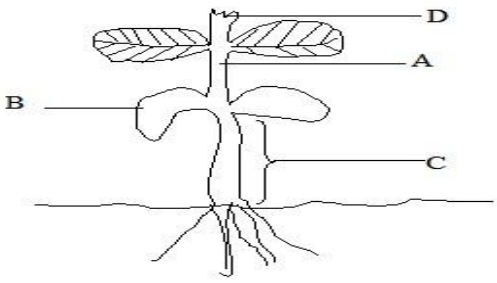
SECTION A (40 marks)

Answer all questions in this section.

1. Haemophilia is a sex linked disorder due to a recessive gene. A carrier woman married a normal man. Let H represent gene for normal condition and h to represent gene for haemophiliac condition.

(a) State the genotypes of ; (2 marks)
(i) Man.
(ii) Woman
(b) (i) Using a punnet square, show the genotypes of the children resulting from this marriage. (3 marks)
(ii) State the probability of getting a carrier daughter. (1 mark)
(c) Give an explanation why haemophilia is more common in males than in females. (2 marks)

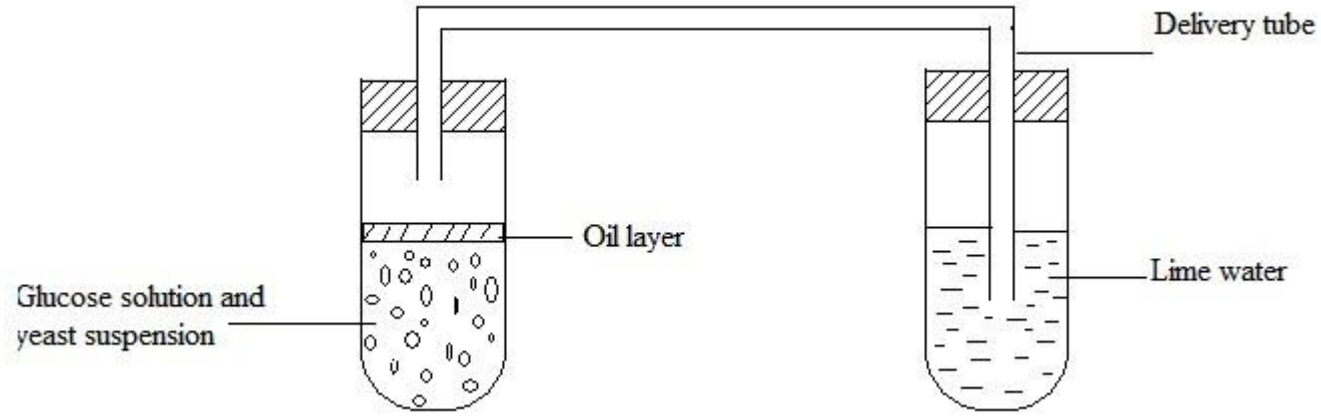
2. The figure below shows a germinating seedling.



(a) Name the parts labelled. A,B C (3 marks)
(b) Give **three** important environmental conditions that are necessary for seed germination and state why they are important.

(3 marks)

(c) The part labelled D was removed from the above seedling three months later. After a few daysthe plant became bushy with several lateral branches.
(i) What is this phenomenon called? (1 mark)
(ii) Why did the removal of the stem tip result in a shorter plant with bushy growth? (1 mark) 3. The diagram below shows a set-up that was used to demonstrate fermentation.

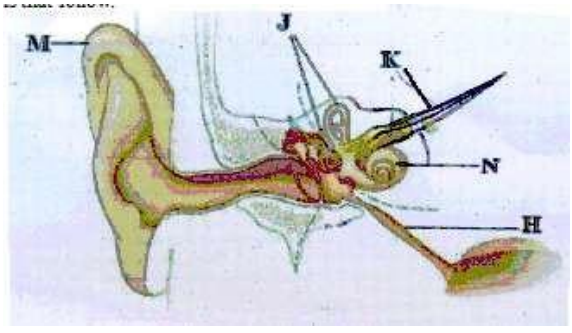


The glucose solution was boiled; then allowed to cool before adding the yeast suspension.

Oil was then added on top of the mixture.

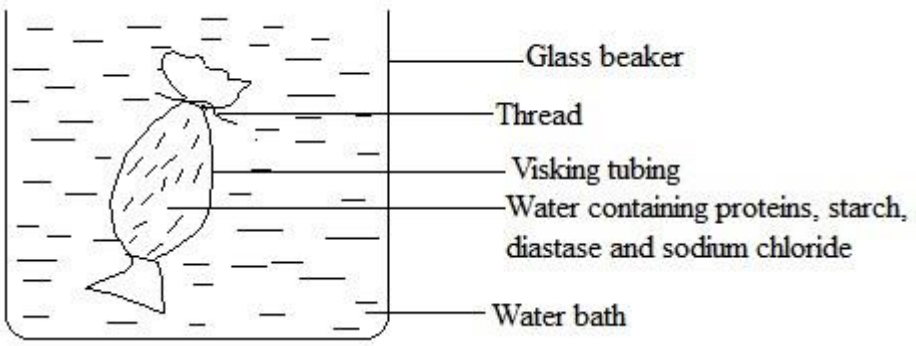
(a) Why was the glucose solution boiled before adding the yeast suspension? (1 mark)
(b) What was the importance of cooling the glucose solution before adding the yeast suspention? (1 mark)
(c) What was the use of the oil in this experiment? (1 mark)
(d) Give **two** reasons why accumulation of lactic acid during vigorous exercise lead to anincrease in heart beat. (2 marks)
(e) Other than carbon (IV) oxide, name the other products of anaerobic respiration in plants. (2 marks)
(f) Suggest a control for this experiment. (1 mark)

4. The diagram below represents a section through the mammalian ear. Study it and answer the questions that follow.



(a) Name the structures labelled H and J. (2 marks)
(b) State how the structures labelled H, M and N are adapted to their functions. H,M,N (3 marks)
(c) State what would happen if the structure labelled K was completely damaged? (1 mark)
(d) Name the fluid contained in structure N. (1 mark)
(e) Apart from hearing, state the other role performed by the human ear. (1 mark)

5. In a physiological experiment, starch, protein, diastase and sodium chloride (common salt) were added to water and put inside a visking tubing. The visking tubing was then placed in a water bath maintained at a temperature between 35^0C and 40^0C. The set-up was as shown in the diagram below.



The following observations were made after the procedures indicated.

Contents In	At the start of experiment	After 1 hour
Visking tubing	(i) Solution tastes salty	Solution tastes salting
	(ii) Visking tubing is not firm	Visking tubing firm.
	(iii) After boiling with Benedict's solution, solution remains blue	After boiling with Benedict's solution, the solution turns brown.
	(iv) On addition of sodium Hydroxide followed by copper(II) sulphate solution to the solution, the colour changed purple	On addition of sodium hydroxide followed by copper (II) sulphate solution `to the solution, the colour changes to
Beaker	(i) Water is tasteless	Solution tastes sweet / salty
	(ii) After boiling solution with Benedict's solution, blue colour remains.	After boiling solution with Benedict's solution, colour turns brown.
	(iii) On addition of sodium hydroxide followed by copper sulphate, solution, colour remains blue.	On addition of sodium hydroxide followed by copper sulphate solution, colour remains blue.

(a) Name the process by which salt moved into the water in the beaker from the visking tubing. (1 mark)
(b) (i) Name the food substance responsible for the brown colour observed after one hour both in the beaker and visking tubing when solutions were boiled with Benedict's solution. (1 mark)

(ii) Account for the observation in b(i) above. (3 marks)

(c) (i) Name the food substance tested with sodium hydroxide followed by copper sulphate solutions. (1 mark)

(ii) Account for the absence of the food substance named in c(i) above in the beaker after1 hour. (1 mark)

(d) After one hour, the visking tubing was firm. State the term used to describe this state. (1 mark)

SECTION B (40 marks)

Answer questions 6 (compulsory) on the spaces left after each question and either question 7 or 8 on the spaces provided after question 8.

6. In an experiment to investigate the effects of light intensity on the rate of photosynthesis, a shoot of Elodea (water weed) was used. The shoot was immersed in 2% sodium hydrogen carbonate solution maintained at 15^0C in an apparatus which allowed for collection of a gas evolved from the shoot. The gas given off was collected for five minutes at each light intensity and its volume recorded as shown below.

Light intensity (arbitrary units)	1	2	4	7	12	18	26	37	46
Gas evolved (cm^3/5 min)	0.45	0.70	0.95	1.40	1.75	1.82	1.90	1.90	1.90

(a) Using the data given in the table, plot a graph of gas evolved against light intensity. (6 marks)
(Graph on the next page)

(b) Account for the rate of gas evolved between;
(i) 1 - 18 arbitrary units. (3 marks)
(ii) 26 - 46 arbitrary unts. (2 marks)

(c) Explain why a green leaf is normally tested for the presence of starch instead of glucose. (2 marks)

(d) How is the dry mass of a leaf determined? (3 marks)

(e) Describe how the chloroplast is adapted to its function. (4 marks)

7. (a) State **four** characteristics of gaseous exchange surfaces. (4 marks)

(b) Explain the starch-sugar interconversion theory of opening and closing the stomata in plants. (16 marks)

8. Discuss the various evidences which show that organic evolution has taken place. (20 marks)

MURANG'A SOUTH SUB-COUNTY MULTILATERAL EXAMINATION
Kenya Certificate of Secondary Education
CONFIDENTIAL
BIOLOGY 231/3

Each candidate should have:-

- Starch suspension labelled liquid X.
- Iodine solution.
- Benedict's solution.
- 2 M hydrochloric acid (1 ml)
- 2 droppers.
- Measuring cylinder (10 ml size)
- Means of heating / Bunsen burner.
- 5 test-tubes.
- Water in a small beaker
- Thermometer
- Test-tube holder
- Thermometer
- 3 boiling tubes
- Tripod stand and gauze
- 3 labels

- White tile
- Water bath
- Diastase / amylase enzyme (0.5 g per student) labelled substance Q.
- Twine of freshly picked pass:flora edulis (passion fruit) with 2 -3 leaves and long coiled tendrils.

NB: Liquid X is prepared by dissolving 1 g of soluble starch in 50 ml of distilled water. Thorough stirring is required whenever it is being used.

MURANG'A SOUTH SUB-COUNTY MULTILATERAL EXAMINATION
kenya certificate of secondary education

231/3
BIOLOGY
PAPER 3 (PRACTICAL)
TIME:2 HOURS.

Answer all questions.

1. You are provided with liquid X and substance Q.

(a) Place three drops of liquid X onto a white tile, Add four drops of iodine solution and record your observation. (1 mark) (b) Pour 2 ml of liquid X into a test-tube. Add equal amount of Benedict's solution and boil the mixture. Record your

observation. (1 mark)

(c) Label three boiling tubes as set-ups A, B and C. Place 3 ml of liquid X into each of the set-ups.

Divide substance Q into three equal portions.

- To set-up A, add one portion of substance Q and shake.
- Place the second portion of substance Q into a test tube. Add 1 ml of water to it and boil for two minutes. Add it to set-up B and shake.
- To set-up C, add the third portion of substance Q. Add 8 drops of 2 M hydrochloric acid and shake.

Place the three set-ups in a warm water bath maintained at 37^0C for 40 minutes.

Cool the set-ups by dipping the boiling tubes in cold water.

Place 2 ml of the contents of each set-up into three separate test tubes. Add equal amount of Benedict's solution to each of three test-tubes and boil. Record your observation.

Set-up A. (1 mark)

Set-up B (1 mark)

Set-up C (1 mark)

(d) Account for your observations in the set-ups;

Set-up A. (1 mark)

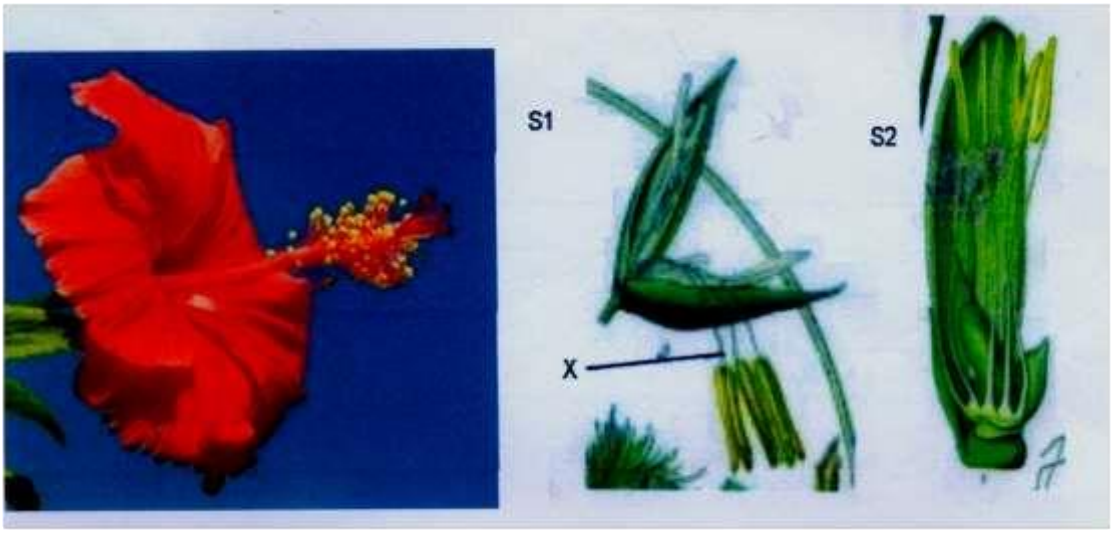
Set-up B (1 mark)

Set-up C (1 mark)

(e) Suggest the identity of substance Q. (1 mark)

(f) Give a reason why the temperature of the water bath was maintained at 37^0C. (2 marks)

2. Below are photographs of specimens obtained from plants. Examine the photographs.



(a) For each of the specimens, name the mode of pollination and the features that adapt the spaciments to the mode of pollination.

Specimen R

- Mode of pollination. (1 mark)
- Adaptive features. (2 marks)

Specimen S1

- Mode of pollination. (1 mark)
- Adaptive features. (2 marks)

(b) Label any **four** parts on specimen R. (2 marks)

(c) Name the structure labeled X on specimen S1. (1 mark)

(d) Using observable features only state two differences between R and S1. (2 marks)

(e) With a reason, name the class of the spermatophyta to which specimen R and S2 belongs.

Specimen R.

Class (2 marks)

Reason

Specimen S2.

Class (2 marks)

Reason

3. You are provided with specimen P.

(a) Classify the specimen into kingdom and class giving reasons in each case,

Kingdom. (1 mark)

Reason (1 mark)

Class. (1 mark)

Reasons (2 marks) (b) Describe the external features of one of the leaves of specimen P. (2 marks)

(c) Identify the prominent string-like structure on one of the axils.

(i) Give the identity of the structure (1 mark)

(ii) How is the structure identified in c(i) above suited to its function? (2 marks)

(d) Name the type of response exhibited by the structure above. (1 mark)

(e) Explain why the tip of the structure named in c (i) above appears as it is under its natural ecosystem. (3 marks)

KIMA JOINT EVALUATION TEST
Kenya Certificate of Secondary Education

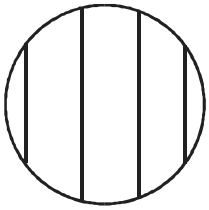
BIOLOGY
Paper - 231/1

Time: 2 hours

1. State the importance of the following processes to living organisms.

a) Locomotion. (1 mark)
b) Irritability (1 mark)
2. Distinguish between taxon and taxonomy. (2 marks)
3. a) State the functions of the following organelles.
i) Centriole (1 mark) ii) Nucleolus. (1 mark)

b) A form one student trying to estimate the size of onion cells observed the following on the microscope field of a view.



i) Define the term resolving power. (1 mark)
ii) If the student counted 20 cells across the field of view, calculate the size of one cell in micrometers. (2 marks)

4. a) State **two** disadvantages of fossil records as an evidence of evolution. (2 marks)
b) What is adaptive radiation. (1 mark)
5. A potato cylinder measuring 100 mm was placed in a concentrated salt solution for 30 minutes. Describe its texture and
appearance after 30 minutes. (3 marks)
6. In a family with four children, the father had blood group A while the mother had blood group B. One of the children had blood group O.
a) What are the genotypes of the parents (2 marks)
b) What was the genotype of the child with blood group O? (1 mark)
7. Explain why a cross-circuit athlete pants heavily after sprint race. (3 marks)
8.a) Distinguish between homologous and analogous structure as used in evolution. (2 marks)

b) i) What are vestigial structures. (1 mark) ii) Give an example of a vestigial structure in humans. (1 mark)

9. a) Name a respiratory substrate usually available for energy release during starvation. (1 mark) b) What is respiratory quotient. (1 mark)
10. a) Give the difference between pyramid of biomass and pyramid of numbers. (2 marks)
b) Why is pyramid of biomass a better method of representing ecological relationships in habitats. (1 mark)

11. Name the types of joints formed by each of the following pairs of bones.
i) Axis and Atlas (1 mark) ii) Humerus with clavicle and scapula. (1 mark) iii) Tibia and fibula with femur. (1 mark)
12. a) How does each of the following structures in the mammalian skin adapted to perform its function?

i) Cornified layer. (1 mark) ii) Sebaceous gland. (1 mark) b) Explain why protein is absent in urine of a normal person. (1 mark)

13. Name the part of the brain responsible for:

a) Maintaining balance and posture of the body. (1 mark)

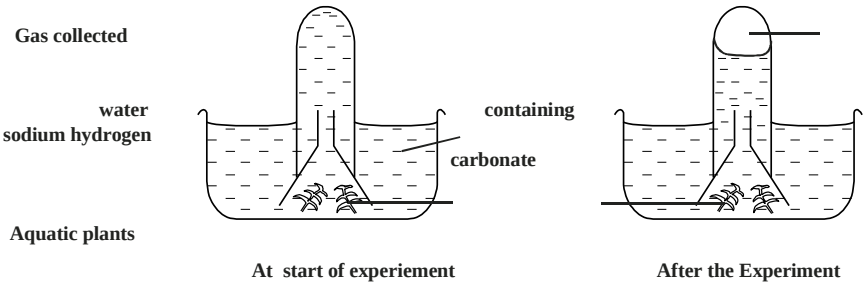
b) Controls heart, breathing and involuntary responses. (1 mark)

14. Give a reason for each of the following:

a) Wind pollinated flowers produce large quantities of pollen grains. (1 mark)

b) Flowers of certain plants show heterostyly. (1 mark)

15. The set-up below shows an experiment to investigate photosynthesis.



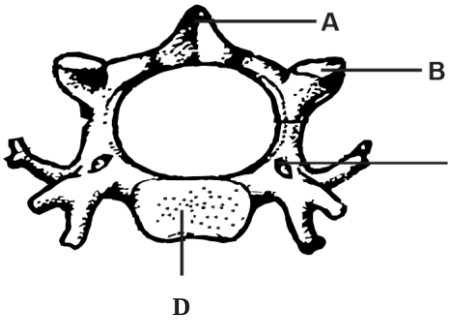
a) What gas was collected in the test-tube. (1 mark)

b) What two environmental conditions are necessary for the experiment? (2 marks)

c) What was the role of sodium hydrogen carbonate in the experiment. (1 mark)

16. State **THREE** ways in which schistosoma species is adapted to parasitic mode of life. (3 marks) **17.** Study the diagram below and answer the questions that follow.

C



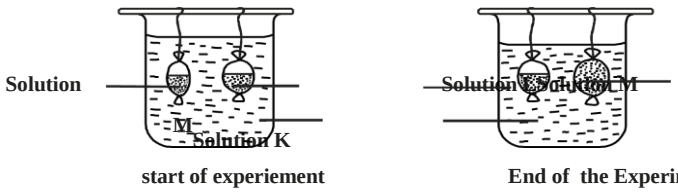
a) Identify the diagram above. (1 mark)

b) State **one** reason for your answer in (a) above. (1 mark)

c) Name the parts labelled A and B. (2 marks)

18. Name the mineral element obtained from insects by insectivorous plants. (1 mark)

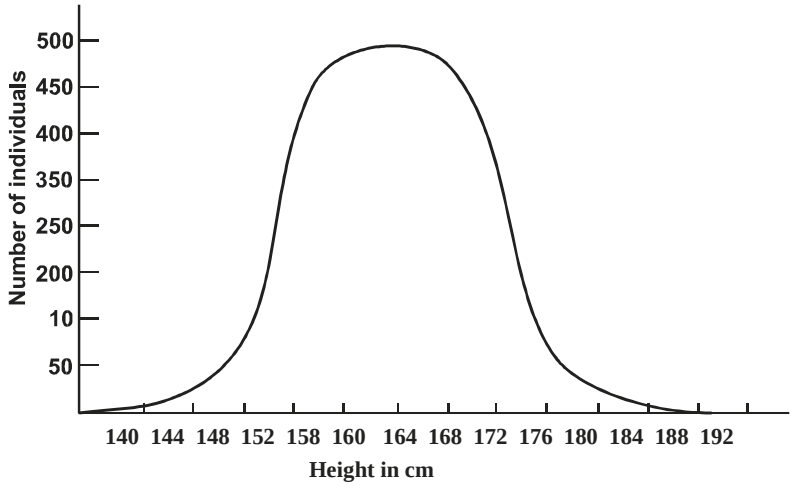
19. In an experiment, two equal volumes of solutions L and M were placed into visking tubings. The two viskig tubings were suspended as shown below.



Explain the results that were obtained in the visking tubings at the end of the experiment. (4 marks)

20. Give a reason why primary productivity in an aquatic ecosystem decrease with depth. (1 mark)

21. In an experiment to observe some variations in lengths of leaves of Jacaranda, the following curve was obtained.



i) Identify the type of variation illustrated by the curve. (1 mark)

ii) Explain the cause of the variation you have named in (i) above. (1 mark)

22. a) What is a drug? (1 mark) b) How does drug abuse expose one to the dangers of HIV/AIDS (1 mark)

23. Explain what happens when diaphragm muscles contract during breathing in mammals. (3 marks) **24.** Give **two** reasons why potato tubers become sweeter after boiling. (2 marks) **25.** Give **two** adaptive features the make a predator efficient in capturing prey. (2 marks) **26.** List **three** ways in which the proximal convoluted tubule is adapted to its functions. (3 marks)

27. Briefly explain the meaning of the following terms as used in ecology. (3 marks) i) Carrying capacity ii) Habitat iii) Community

28. Briefly **outline** the function of the following parts of the human brain. (2 marks) i) Cerebrum ii) Hypothalamus

29. a) State the **function** of a tendon in mammalian skeleton. (1 mark)

b) Outline **three** differences between smooth muscles and skeletal muscles. (3 marks)

KIMA JOINT EVALUATION TEST

Kenya Certificate of Secondary Education

BIOLOGY

Paper - 231/2

Time: 2 hours

SECTION A : (40 marks)

Answer ALL the questions in this section in the spaces provided.

1. A woman with normal skin pigmentation was married to a man with normal skin pigmentation. They had two children, one with normal skin colour, genotype AA, while the other one was an albino.

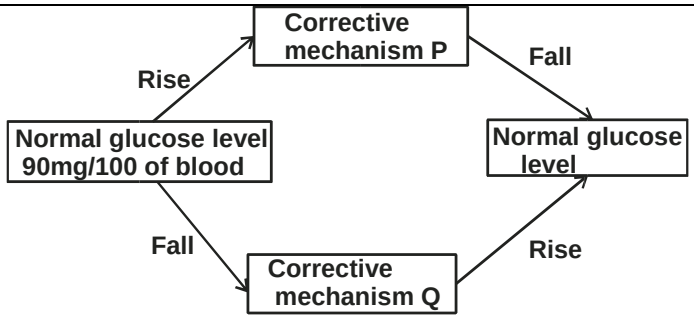
a) State the couple's genotypes. (1 mark)

b) Using a genetic cross, show how they were able to produce an albino and a normal skinned child. (4 marks)

c) What is the percentage of their third child being an albino? (2 marks)

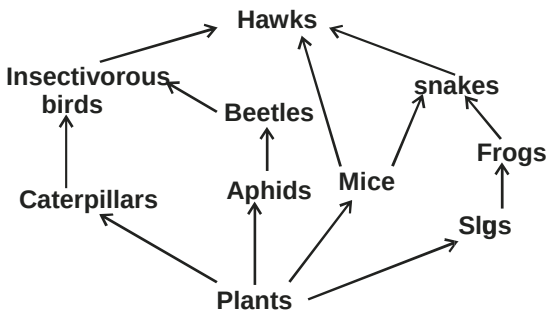
d) State one way one could easily identify an albino. (1 mark)

2. The diagram below shows how blood glucose in mammalian body is regulated.



a) Explain what happens during corrective mechanism P. (3 marks)
b) Name **two** organs involved in corrective mechanisms P and Q. (2 marks)
c) State **two** reasons why glucose level should be maintained constant. (2 marks)
d) What is osmoregulation? (1 mark)

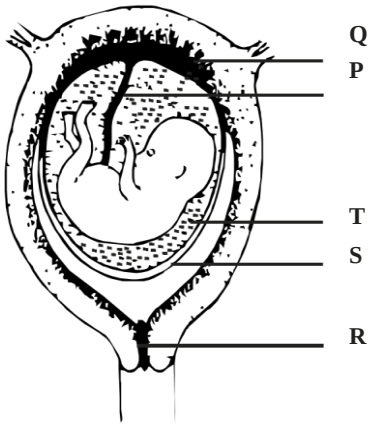
3. The diagram below represents a food web in a certain ecosystem.



a) i) Name the group of organisms that would have the largest biomass
(1 mark) ii) Give a reason for your answer in a(i) above.
(1 mark) b) Construct food chain ending with

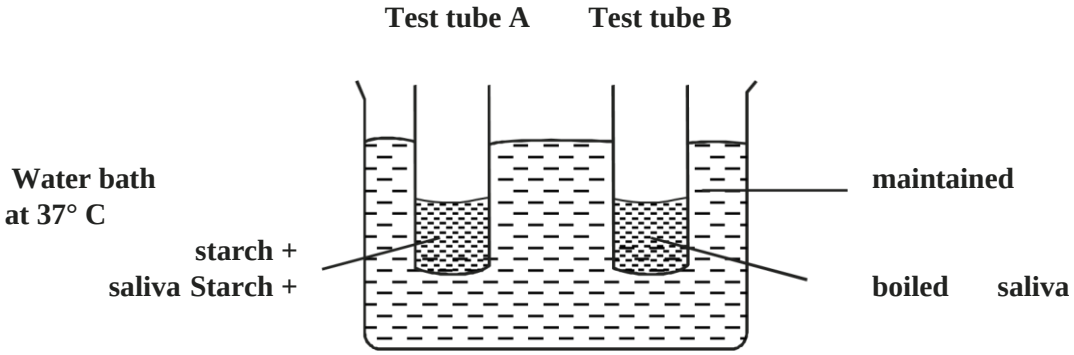
i) Tertiary consumer (1 mark) ii) Quaternary consumer (1 mark)

c) State **two** short term effects on the ecosystem if there were prolonged droughts. (2 marks) **4.** The diagram below represents a mammalian embryo and associated maternal structures.



a) Name the parts labelled R and S. (2 marks)
b) State THREE adaptation of part Q to its functions. (3 marks)
c) i) Name the part labelled T. (1 mark) ii) What is the function of part T? (1 mark)

5. In an experiment to investigate an aspect of digestion, two test tubes A and B were set up as shown in the diagram below.



The test tubes were left in the bath for 30 minutes. The contents of each test tube was then tested for starch using iodine solution.

a) What was the aim of the experiment? (1 mark)
b) What results were expected in test tube A and B. (2 marks)
c) Account for the results you have given in (b) above in test tube A and B. (2 marks)
d) Why was the set up left at 37°C? (1 mark)
e) State two functions of bile juice in digestion. (2 marks)

SECTION B (40 MARKS)

Answer question 6 (COMPULSORY) and either Q 7 or Q 8.

6. In a practical lesson, the following data of results was obtained of growth measurement of organism over a period of 24 days during its development.

Day	Width of head (mm)	Length of hind femur (mm)
1	3.0	7.0
3	4.0	8.0
5	4.0	8.0
7	4.0	9.2
9	4.7	12.0
11	5.0	12.0
13	5.0	12.0
15	5.0	12.0
17	5.7	14.8
19	7.0	18.0
21	7.6	18.0
23	7.6	18.0

a) Using a suitable scale, draw graphs of width of head and length of femur against time on same axis. (7 marks)
b) i) Name the growth pattern represented by the graphs. (1 mark)

ii) With reference to the graph, identify the phylum to which the organism belongs. Give reason. (2 marks) c) Account for the length of hind femur betweeni) 3 and 7 day. (3 marks) ii) 7 and 10 day (3 marks) d) State **TWO** hormones involved in the growth pattern represented above. (2 marks)

e) What is the width of the head and length of femur on day 18? (2 marks)

7. a) Describe how water reaches the xylem tissue of the root in a plant from the soil. (8 marks)
b) Describe the adaptations of the following components of blood to its functions.
i) Red blood cell. (8 marks) ii) White blood cells (4 marks)

8. a) Explain the conditions necessary for germination in seeds. (12 marks)
b) Describe **four** adaptive characteristics features of respiratory surfaces. (8 marks)

KIMA JOINT EVALUATION TEST
Kenya Certificate of Secondary Education
BIOLOGY
Paper - 231/3
Time: 1¾ hours

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1. You are provided with a specimen labelled P. Study it carefully.

a) With observable features only identify specimen P (2 marks) i) Identity ii) A reason
b) Make a transverse section of specimen P.
i) Use one half of the cut section of specimen P to draw a well labelled diagram. (4 marks) ii) Show your magnification. (2 marks)

c) Take another half of specimen P. Press it into the beaker to make an extract.
Use part of the extract and 2cm³ of DCPIP solution in a test tube to complete the table below. (2 marks)

TEST	Observations	Conclusion
DCPIP test		

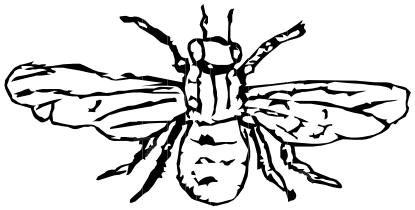
d) Use the reagents provided to carry out various food tests.
i) Benedict's test.
Procedure. (1 mark)

Observations (1 mark)
Conclusion (1 mark)
ii) Iodine solution test

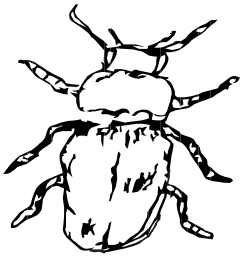
Observations. (1 mark)

Conclusion (1 mark)

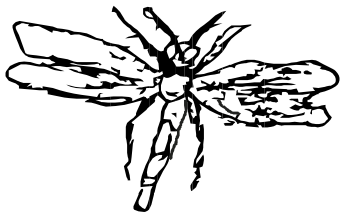
2. Below are drawings of some organisms belonging to the same phylum. Examine them carefully.



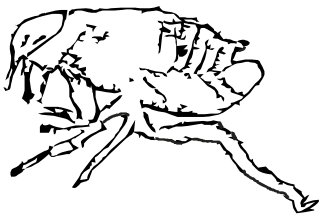
Diptera



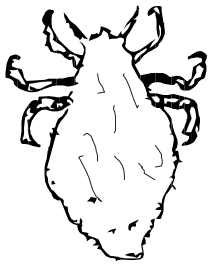
Coleoptera



Odonata



Siphonoptera



Anoplura

a) i) Name the phylum to which the organism represented by the drawings belong. (1 mark)

ii) Give two reasons for answer in a(i) above. (2 marks)

c) Using the features in the order given below, construct a dichotomous key that can be used to identify the specimens.

(10 marks)

- Presence or absence of wings.
- Shape of the body
- Length of antennae - Type of wings - Number of wings.

3. a) Study the photography below to enables you answer the questions that follow.



i) Use arrows to show on the photograph the direction from which the light was coming. (1 mark)

ii) What was the aim of the experiment? (1 mark)

iii) Suggest a control experiment for this set up. (1 mark)

iv) Explain the mechanism of response shown in the photograph. (4 marks)

b) Study the photograph below. The specimen had been placed in adequate light at a horizontal position for one week.



i) What was the aim of this experiment? (1 mark)

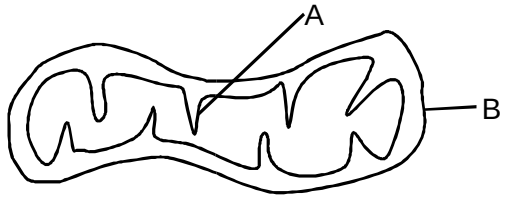
ii) What would be the result if seedling is placed on a working klinostat? (1 mark)

iii) Explain how the results at the point shown by the arrow occurred. (3 marks)

KANDARA SUB COUNTY SECONDARY SCHOOLS
FORM FOUR
JOINT EXAMINATION
Kenya Certificate of Secondary Education
231/1
BIOLOGY
Paper 1

1.

The diagram below represents a cell organelle.



a) Name the part labelled B. (1 mark)
b) State the function of the part labelled A. (1 mark)

2. Name the part of a flower that develops into:
a) A fruit. (1 mark)
b) A seed (1 mark)

3. a) Name **one** strengthening tissue in plants. (1 mark) b) How is support attained in plants that lack the named tissues above? (1 mark)

4. a) Name the fluid that is produced by sebaceous glands. (1 mark) b) Explain the importance of sweat on the human skin. (1 mark)

5. State **one** way in which floating leaves of aquatic plants are adapted to gaseous exchange. (1 mark)

6. a) State **three** characteristics of monera that are not found in other kingdoms. (3 marks)
b) Name the class to which the tick belongs. (1 mark)

7. a) Name **one** disease of the circulatory system in humans. (1 mark)

b) Name **two** forms in which carbon (IV) oxide is transported in blood. (2 marks)
c) Give a reason why red blood cells have no nucleus. (1 mark)

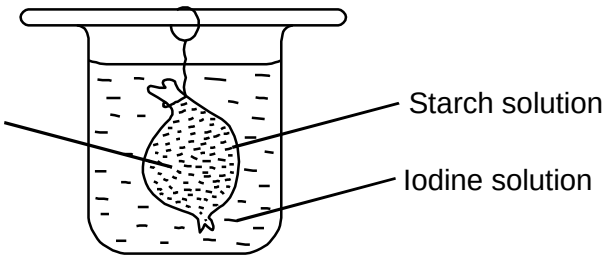
8. State the role of vitamin A in humans. (2 marks)

9. a) State **two** processes which occur during prophase 1 of meiosis. (2 marks)
b) What is the significance of mitosis? (1 mark)

10. State the type of response exhibited by the following:
a) Sperm cell as its swims towards the ovum. (1 mark)
b) Feeding in insectivorous plant. (1 mark)

11. State the role of glycogen in the human body. (1 mark)

12. An experiment was set up as shown in the diagram below.



The set up was left was 30 minutes.

a) State the expected results from the starch solution. (1 mark)
b) Explain your answer in (a) above (3 marks)

13. $C_6H_{12}O_6 \square 6O_2 \square 6CO_2 \square 6H_2O \square 36ATP$

a) Identify the type of respiration illustrated in the equation above. (1 mark)
b) Explain why lactic acid was not produced in the reaction illustrated in the equation above. (2 marks)

14. a) State **two** advantages of metamorphosis to the life of insects. (2 marks)

b) During germination and early growth, the dry weight of endosperm decreases while that of the embryo increases.

Explain. (1 mark)

15. a) Explain how the process of evolution may result to the formation of a new species. (2 marks) b) What is meant by
i) Organic evolution. (1 mark) ii) Continental drift (1 mark)

16. a) State how excessive use of pesticides may affect soil fertility. (2 marks) b) State **two** measures that can be taken to control infection of man by protozoon parasites. (2 marks)

17. What is the importance of the following in an ecosystem? (2 marks)
a) Decomposers .....
b) Predation .....

18. A certain animal has no incisors, no canines, 6 premolars and 6 molars in its upper jaw. In the lower jaw there are 6 incisors,
2 canines, 6 premolars and 6 molars. Write its dental formula. (1 mark)

19. a) State the function of co-factors in the cell metabolism (1 mark) b) Give an example of a metallic co-factor. (1 mark)
c) Give a reason why lack of roughage in the diet often leads to constipation. (1 mark)

20. a) Name **two** mechanisms that prevent self-pollination in the flower that have both male and female parts. (2 marks)

b) After four months of pregnancy, the ovaries of a woman can be removed without terminating pregnancy. However,

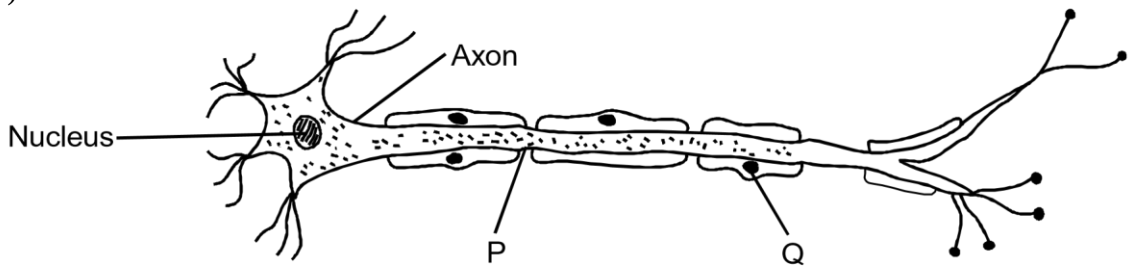
during the first four months of pregnancy, the ovaries must remain intact if pregnancy is to be maintained. Explain

these observations. (3 marks)

21. The diagram below represents a motor neurone.

a) Identify the plant part. (1 mark)
b) Give a reason for your answer in (i) above. (1 mark)
c) Name the parts marked A and B. (2 marks)

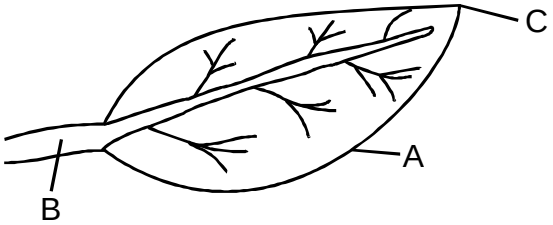
28. State the form in which carbohydrates are stored in
i) Plants. (1 mark)
ii) Animals (1 mark)



a) With an arrow, indicate on the diagram the direction of the impulse through the neurone. (1 mark)
b) State the function of parts labelled P and Q. (2 marks)

22. State **three** biological importances of tactic responses to plants. (3 marks)

23. a) State **two** functional differences between the rods and cones in the human eye. (1 mark)
b) Sate the function of ciliary muscles in the human eye. (1 mark)



24. a) Name the cartilage between the bones of the vertebral column. (1 mark)
b) State the function of the cartilage named in (a) above. (1 mark)
c) State how the skeletal muscle fibres are adapted to their function. (1 mark)

25. a) State the function of the following parts of a mammalian ear:
i) Tympanic membrane
..... ii) Eustachian tube
..... iii) Ear ossicles
.....

b) Explain how the semi-circular canals perform their functions. (3 marks)

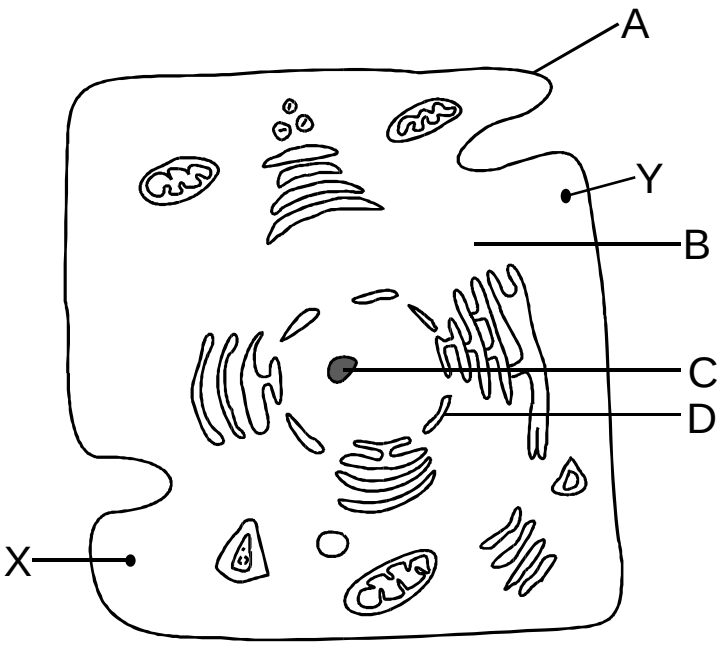
26. Describe the path taken by carbon (IV) oxide released from the tissue of an insect to the atmosphere. (3 marks)

27. The diagram below show a part of a plant.

KANDARA SUB COUNTY SECONDARY SCHOOLS
FORM FOUR JOINT EXAMINATION
Kenya Certificate of Secondary Education
231/2
BIOLOGY
Paper 2
(Theory)
SECTION A : (40 marks)

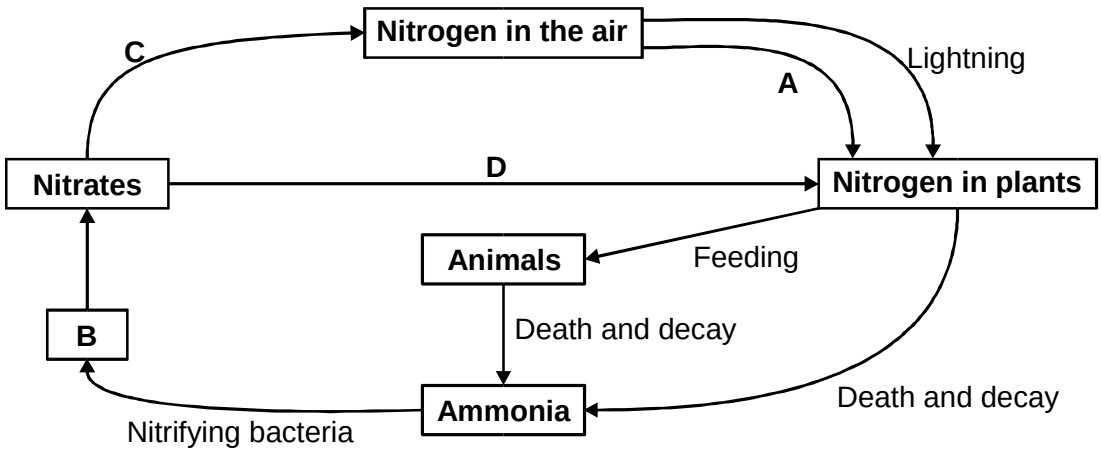
Answer ALL the questions in this section in the spaces provided.

1. The diagram below shows a certain cell. Use it to answer questions that follow.



a) Identify the structures labelled A, B, C and D (4 marks)
b) Measure the length of the distance between point X and Y. If the magnification of the above cell is ×10,000. Calculate the actual diameter of the cell between points XY in micrometers. Show your working. (2 marks)
c) With a reason identify the kingdom from which the cell was obtained. (2 marks)
Kingdom.....
Reason.....

2. The diagram below represents the nitrogen cycle.



a) State the process labelled. (2 marks)

A..... D .....

b) Name the compound represented by B. ..... (1 mark)

c) Name the group of organisms labelled C..... (1 mark)

d) i) Name the group of plants which promote process A. (1 mark)

ii) State the part of the plant where process A takes place. (1 mark)

e) How would excess pesticides in the soil interfere with process A. (2 marks)

3. In humans, haemophilia is sex linked, caused by recessive gene, which exerts its effect when in homozygous state. A man whose mother was haemophilic marries a normal woman whose father was haemophilic. If H represents non-haemophilic, h represents haemophilic gene.

a) What are the possible genotypes of

i) The man

..... (1 mark)

ii) The woman .....
(1 mark)

b) Showing your working, find out the possible genotypes of their F_1 generation. (3 marks)

c) What is the probability of the first born son being haemophilic. (1 mark)

d) Why are sex linked traits more common in males than in females? (1 mark)

e) Name any other one sex linked trait in human beings. (1 mark)

4. **a)** The diagram below represents a mature fruit from a dicotyledonous plant. Observe it and answer questions that follow.



i) To what group of fruits does the specimen belong? ..... (1 mark) ii) Suggest the possible agent of dispersed of the fruit..... (1 mark)

b) State two ways in which male parts of a wind pollinated flower are adapted to their mode of pollination. (2 marks)

c) Differentiate between Monoecious and Dioecious plant. (2 marks)

d) State any two differences between an ovum and a sperm. (2 marks)

5. The photograph below shows an animal organ. Examine it and answer the questions that follow.

a) Identify the part labelled L..... (1 mark)

b) Name the class of the animal from which the organ was obtained. (1 mark)

c) State three ways in which part L is adapted to its functions. (6 marks)

SECTION B (40 marks)

Answer question 6 (COMPULSORY) and EITHER question 7 or 8 in the spaces provided after question 8

6. An investigation was carried to show the effect of antidiuretic hormone (ADH) on urine production in a mammal. The rate of urine production was measured over a period of 30 minutes. Five minutes after measurements began; ADH was injected into a vein of the mammal. The results are shown in table below.

a) Plot a graph of rate of urine production against time. (7 marks)

b) Name the gland that releases ADH..... (1 mark)

c) Describe the effect of injection of ADH on the rate of urine production in the mammal in this investigation.(3 marks)

d) Describe the mechanism by which ADH produces the effect seen in this investigation. (4 marks)

e) In a similar investigation, an injection of sodium chloride (salt) solution was given after five minutes instead of ADH. This injection was observed to affect urine production in a similar way to ADH. Suggest how the sodium chloride brought about this effect. (5 marks)

7. Describe the various evidences which support the theory or organic evolution. (20 marks)

8. Describe the functions of the main blood components in mammals. (20 marks)

KANDARA SUB COUNTY SECONDARY SCHOOLS
FORM FOUR JOINT EXAMINATION
Kenya Certificate of Secondary Education
231/3
BIOLOGY
Paper 3
(Practical)

1. You are provided with specimen labelled K1.

Examine the specimen

a) i) Given that the specimen K1 is a modified stem, draw and label a diagram of the specimen showing observable features which support this view. (3 marks) ii) How does this specimen obtain oxygen from the soil for respiration? (1 mark)

b) Cut four rectangular strips of specimen K1 each strip should be of 5mm wide by 20mm long. Place two stripes into solution Q and another two into solution T. Allow the experimental set ups to stand for 10 minutes.

i) Using your fingers feel the texture of the strips in each solution. Record your observations from each solution, below

Solution T (1 mark)

Solution Q (1 mark) ii) Measure the strips from each solution and record your measurement in the table below. (4 marks)

	Initial length	Final length	Change in length
Solution T 1 2			
Solution Q 1 2			

iii) Account for the results in each of the solution.

Solution T (1 mark)

Solution Q (1 mark)

c) i) Substance K2 has been obtained from specimen KI. (Cut small pieces of K1 and crush them using a mortar and pestle. Add water and decant to obtain K2). Use the substance and procedure provided to carry out the following experiments.(3 marks)

	Procedure	Observation	Conclusion
i)	Put a sample of substance K2 on a white tile. Add two drops of iodine solution		
ii)	To another portion in a testtube add $2cm^3$ of Benedict's solution and heat		
iii)	Put another portion in a testtube. Add solution L and heat gently for one minute cool. Add drops of sodium hydrogen carbonate until effervescence stops. Add $2cm^3$ of Benedict's solution and heat		

ii) Account for your results in c(i)iii above (1 mark) iii) Suggest the identity of solution L. (1 mark)

2. Refer to the photograph of insects provided below. Examine them and answer the following questions.

a) Use the dichotomous key below to identify the specimens. Write down in correct order the steps (number and letter) that you followed to arrive at your answer.

Dichotomous key.

1. a) Animal with wings. . . . . go to
b) Animal without wings . . . . . go to 7
2. a) With two pairs of wings . . . . . go to 3

b) With one pair of wings . . . . . Diptera 3
3. a) With membranous wings . . . . . .go to 4

b) Hard pair of membranous wings . . . . . go to 6
4. a) With long abdomen . . . . . .Odonata

b) Medium-sized abdomen . . . . . go to 5

5. a) Wings with coloured scales . . . . . Lepidoptera
   b) Wings without scales . . . . . Hymenoptera
6. a) Forewings hard and shell-like . . . . . Coleoptera
   b) Forewings hard but not shell-like . . . . . Orthoptera
7. a) Body horizontally flattened . . . . . Isoptera
   b) Body laterally flattened . . . . . Siphonoptera

3. You are provided with specimen M and N obtained from the same animal. Examine them carefully.

	M	**N**
i)		
ii)		
iii)		

a) Identify the specimens and in each case name the region of the body from which it was obtained.(4 marks)
Specimen M .....

Region .....

Specimen N
..... Region
.....

b) State three features of specimen N which adapts it to its functions. (3 marks)
c) State three differences between specimens M and N (3 marks)
d) Draw the anterior view of specimen M, Label any two parts. (3 marks)

KISII CENTRAL FORM FOUR JOINT EVALUATION
Kenya Certificate of Secondary Education
BIOLOGY
Paper - 231/1
Time: 2 hours

1. a) Define the term 'adaptive radiation' (2 marks)
b) Give an example of adaptive radiation in animals. (1 mark)

2. Other than diffusion and transpiration, name two methods by which Angiosperms excrete. (2 marks)

3. Antheridia and Archegonia are male and female producing gametes respectively.
a) Name the plants in which they are found. (1 mark)
b) Name the division to which these plants belong. (1 mark)

4. a) What is carapace? (1 mark)
b) State two ways in which the exoskeleton has helped in the success of Arthropods life in terrestrial habitats.(2 marks)

5. A certain plant was found to have 22 chromosomes in its calyx cells. State the number of chromosomes present in.
(2 marks) a) Embryo sac nucleus
b) Primary endosperm nucleus.

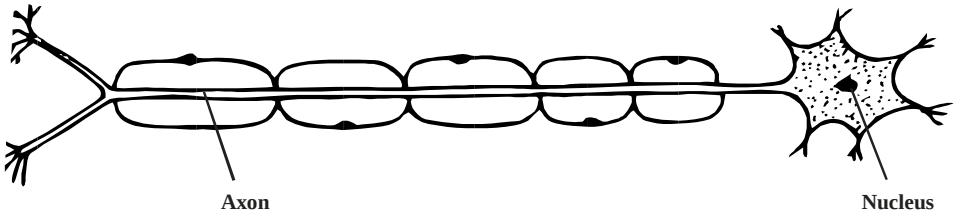
6. The table below shows the percentage composition of inspired and expired air.

Gases	Inspired %	Expired %
Oxygen	21	16
Carbon (IV) oxide	0.04	4
Nitrogen	79	79

a) What percentage of inspired oxygen is taken up by lung capillaries? (1 mark)
b) Account for the difference in composition of carbon (IV) oxide between inhaled and exhaled air. (3 marks)

7. Distinguish between the terms ecosystem and ecological niche. (2 marks)

8. The diagram below represents a type of neurone.



a) i) Identify the neurone above. (1 mark)
ii) Give a reason for your answer in a(i) above. (1 mark)

b) With an arrow, indicate on the diagram the direction of an impulse through the neurone. (1 mark)

9. What is the necessity of support in plants? (2 marks)

10. State two importance of DNA molecule. (2 marks)

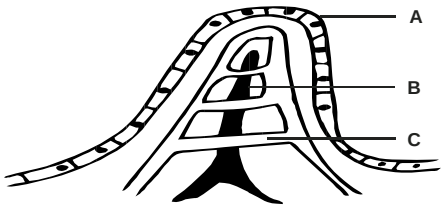
11. Describe how osmotic pressure develops. (3 marks)

12. Name the two stages of photosynthesis and state where each stage occurs. (4 marks)

	Stage of photosynthesis	Where it occurs
i)		

ii)		

13. The diagram below represents part of alimentary canal.



a) Name the structure represented above. (1 mark)
b) Identify the part labelled A. (1 mark)
c) State the products that diffuse into part labelled. B and C (2 marks)

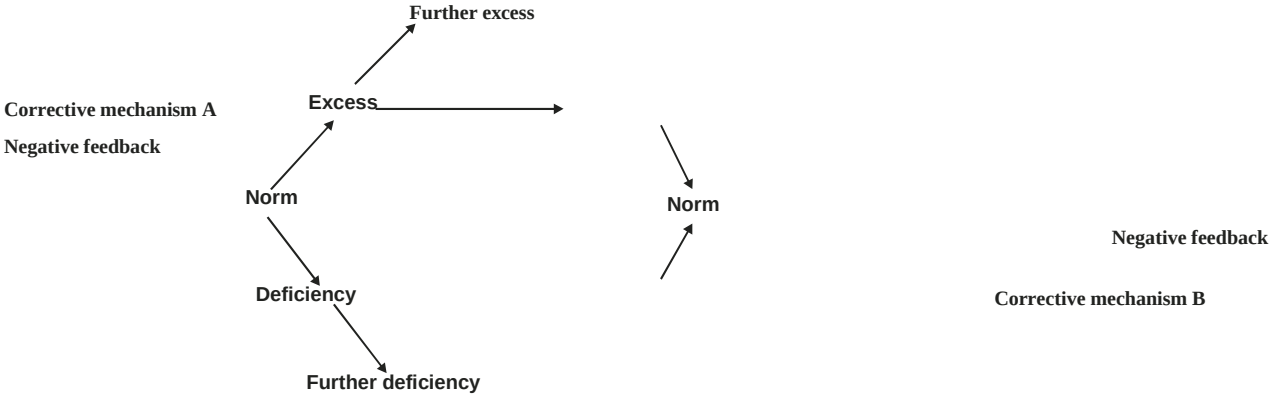
14. State TWO similarities between members of class Aves and class Reptilia. (2 marks)

15. Account for the loss in dry weight of cotyledons in a germinating bean seed. (1 mark)

16. State **TWO** applications of the knowledge gained in biology in controlling the spread of HIV and AIDS. (2 marks)

17. A fresh wound bleeds more in hot weather than in cold weather. Explain. (2 marks)

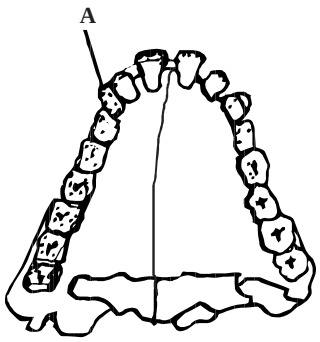
18. Give reasons why plants in cold desert e.g. Arctic and Antarctic regions show xerophytic characteristics. (1 mark) **19.** Study the diagram below and answer the questions that follow.



a) Name the principle labelled X. (1 mark)
b) If the above diagram represented blood sugar regulation.

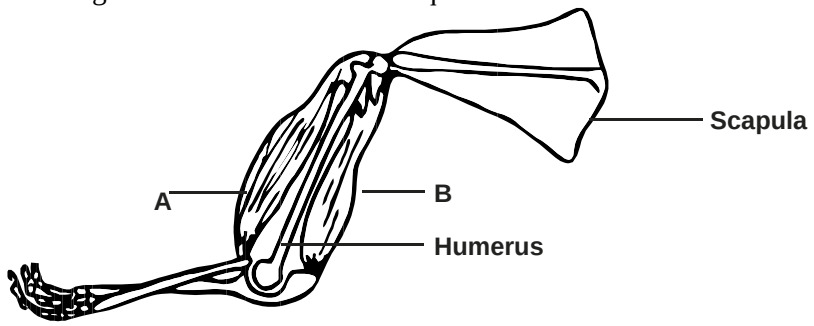
i) State the corrective mechanisms carried out at A. (1 mark)
ii) The condition that may result from the further excess. (1 mark)
iii) The hormone that would be responsible for correcting the deficiency. (1 mark)

20. The diagram below shows the arrangement of teeth in the lower jaw of a human being.



a) Write the dental formula. (1 mark)
b) From the dental formula determine the total number of teeth. (1 mark)
c) How is tooth A adapted to it's functions. (1 mark)

21. a) Study the diagram below and answer the questions that follow.

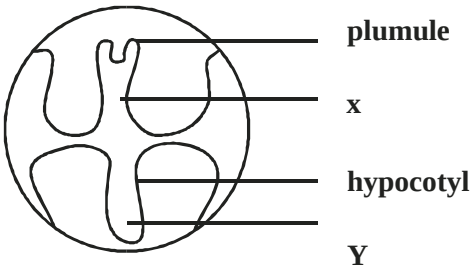


i) Name the muscles labelled A and B.
(2 marks)

ii) What happens to each muscle as the arm is stretched.
(2 marks)

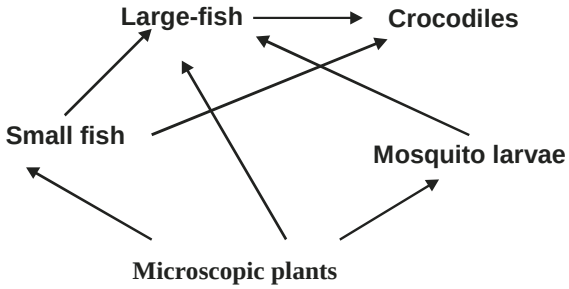
22. Plants of a particular species growing in certain habitat flower at the same time. What is the importance of this adaptation.
(1 mark)

23. The diagram below represents the internal structure of a bean seed.



a) Name the parts the seed embryo represented by letter X and Y. (2 marks)
b) What type of germination would result if the hypocotyl elongates faster. (1 mark)
c) What is the significance of the part labelled Y emerging first during germination. (1 mark)

24. The following diagram shows a feeding relationship in an ecosystem.



a) From the diagram, write down a food chain with crocodile as the tertiary consumer. (1 mark)
b) Which of the above organism would you expect to have the highest population. (1 mark)
c) Give reason for your answer in (b) above. (1 mark)

25. Below is an equation of a reaction that takes place in the liver.

a) Identify the above reaction. (1 mark)

Ammonia □Carbon(IV)oxide□Urea□Water

b) Which enzyme is required in the reaction? (1 mark)

26. Name the causative agent for Vaginal thrush. (1 mark)

27. What is used to achieve the following in an electron microscope?

a) Magnification. (1 mark)

b) Illumination. (1 mark)

28. State the survival value of the following responses.

i) Euglena swimming towards a region with bright light. (1 mark)

ii) Pollen tube growing towards the embryo sac. (1 mark)

29. State one disadvantage of using quadrant method in population estimation. (1 mark)

30. Name the cell organelles that are responsible for the formation of the following organelles. (2 marks) i) Lysosomes ii) Ribosomes

31. What is the meaning of the following terms?

i) Fermentation. (1 mark)

ii) Oxygen debt. (1 mark)

32. a) Haemophilia is a sex - linked disorder caused by a recessive gene located on the x - chromosomes. Give the genotype of a male haemophiliac individual. (1 mark)

b) State ONE cause of variations in organisms that take place during gametogenesis. (1 mark)

33. a) State TWO processes which occur during anaphase of mitosis. (2 marks)

b) What is the significance of meiosis? (1 mark)

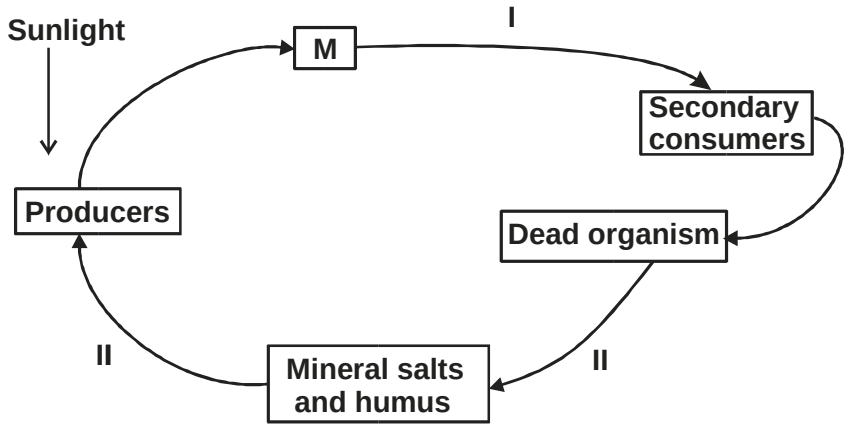
KISII CENTRAL SUB-COUNTY EXAMINATION

PAPER 2

SECTION A : (40 marks)

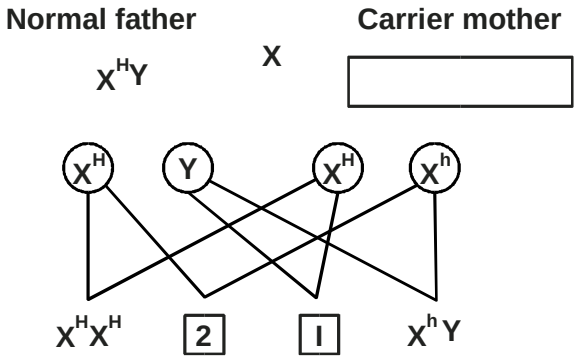
Answer ALL the questions in this section in the spaces provided.

1. The diagram below represents recycling of nutrients in a certain ecosystem.



a) Name the trophic level represented by M. (1 mark)
b) Name the processes represented by. I,II,III (3 marks)
c) Name the organisms involved in process II. (1 mark)
d) What would happen within the ecosystem if all secondary consumers were eliminated? (3 marks)

2. Haemophilia is a bleeders disease. The disease is caused by a recessive gene which is carried in the X chromosome. X^H stands for normal gene whereas X^h stands for haemophilia gene. The figure below shows a family tree.



a) What is the genotype of
i) Mother (1 mark) ii) Son marked 2 (1 mark) iii) Daughter marked 1 (1 mark)

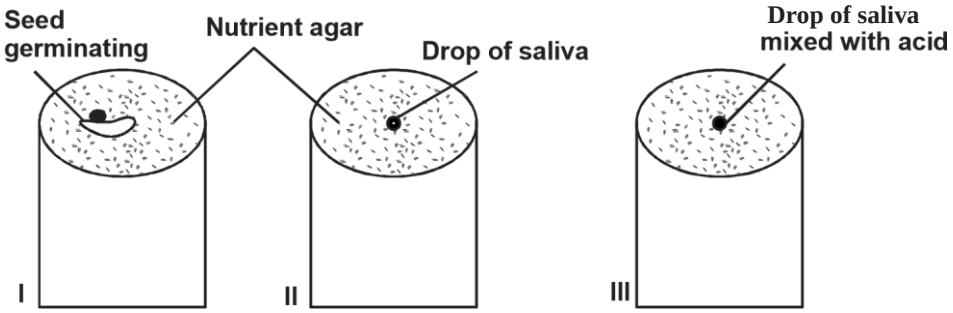
b) If the haemophilia son marries a girl who has no history of haemophilia in her family, what will be the genotype of the
offspring ? (Show your working) (4 marks)
c) What is sex linkage? (1 mark)

3. 50cm³ of 10% glucose solution was boiled and allowed to cool. The solution was then poured into a vacuum flask and about 5cm³ of groundnut oil added to it. 10% yeast solution was introduced into the glucose solution using a pipette. A thermometer was placed in the flask and supported with a cotton wool plug. A second flask was set up

as above, but containing cooled boiled water instead of 10% glucose solution. The temperature of each flask was recorded at the beginning and thereafter at hourly intervals for several hours.

a) Why was a vacuum flask used in this experiment? (1 mark)
b) What was the purpose of the second flask? (1 mark)
c) Write a word equation to summarize the reaction that took place in the first flask. (2 marks)
d) Why was groundnut oil added to the flask? (1 mark)
e) Why was it necessary to boil the glucose and the water before they were poured into the flask? (1 mark)
f) Distinguish between obligate and facultative anaerobes. (2 marks)

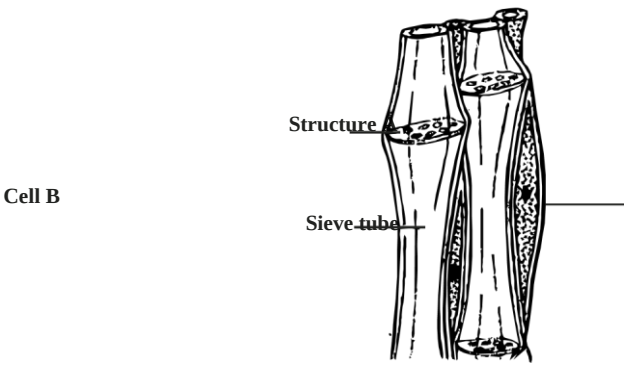
4. Three sterilized petri dishes I, II and III were half filled with sterilized nutrient agar jelly and then treated as shown below. The petri dishes were then kept in an oven at 36°C. After 2 days the three petri dishes were flooded with iodine solution.



a) Yellow spots were noted in set up I and II while set up III turned blue black.

i) What was the importance of sterilization in the experiment? (1 mark)
ii) Mention TWO ways by which sterilization could have been achieved. (2 marks)
b) Explain the results obtained in each of the three petri dishes after 2 days. (5 marks)

5. The diagram below represents phloem tissue from the stem of a plant.



a) i) Name the structure labelled A. (1 mark)
ii) State TWO substances transported in the phloem. (1 mark)
iii) Give the function of cell B. (1 mark)
b) State TWO features of the endodermis. (2 marks)
c) Explain the process by which water moves from the soil into the root hairs. (3 marks)

SECTION B

Answer question 6 (COMPULSORY) and either question 7 or 8 in the spaces provided after question 8.

6. In an experiment, 900 viable seeds of a certain plant species were divided into groups of 100 seeds each. Each group of seeds was placed at different temperatures but same conditions of air and moisture. The percent

germination was determined after 10 days. The table below shows percent germination at the various temperatures.

Temperature °C	0	5	10	15	20	25	30	35	40
Percent germination	0	0	2	5	16	50	84	30	2

a) Using a suitable scale, draw a graph of percent germination against temperature. (6 marks) b) Account for percent germination at :

i) 50° (3 marks) ii) 30°C (3 marks) iii) 40°C (3 marks)

c) Explain the role played by each of the following factors in the germination of seeds.

i) Water. (3 marks) ii) Air. (2 marks)

7. a) Explain how a finned fish such as tilapia is adapted to swimming. (10 marks) b) Describe an experiment to investigate the effects of unilateral source of light on growth of seedlings. (10 marks)

8. a) Describe the economic importance of bacteria. (10 marks) b) Describe how semi-circular canals perform their functions. (10 marks) 231/3

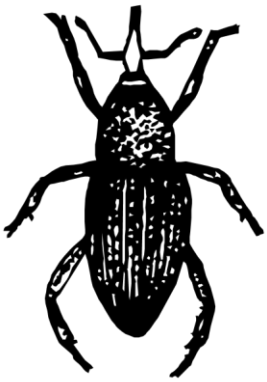
2 hours

1. Study the photographs below carefully and answer the questions that follow.

N



M

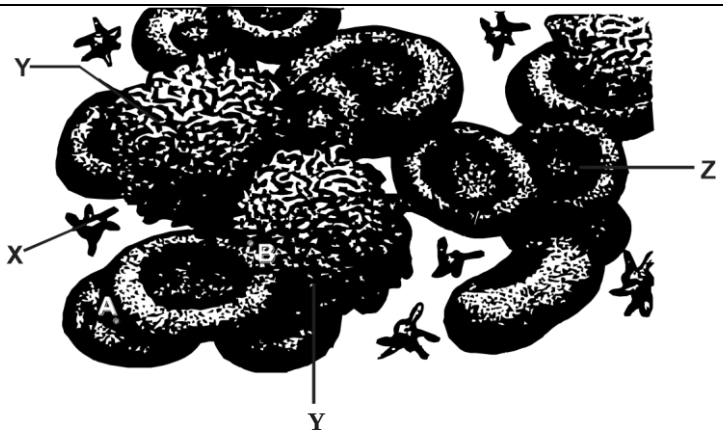


a) Suggest the type of life cycle displayed by organism N. (1 mark)
b) Explain the disadvantages of the life cycle displayed by organism N. (2 marks)
c) Name the type of growth pattern shown by the organisms. (1 mark)
d) i) Give the hormone responsible for the growth pattern stated in (c) above. (1 mark)
ii) State the gland responsible for the production of the hormone above. (1 mark) e) i) Name the phylum to which organism N and M belong.
(1 mark)
ii) Other than the skeleton, state two features common in the members of the phylum identified above. (2 marks) f) Giving two reasons, name the class to which organism M belongs.

Class (1 mark) Reasons: (2 marks)

g) State two functions of exoskeleton. (2 marks)

2. The diagram below represents an animal tissue.



a) Identify the name of the tissue giving reason. (2 marks)

Tissue.....

Reason.....

b) Identify the structures labeled X and Y. (2 marks)

c) State the functions of X and Y. (2 marks)

d) Using an observable feature on the diagram, state how structure Z is adapted to its function. (2 marks)

e) i) Measure the diameter of structure labeled Z from point A to B in millimeters. (1 mark) ii) Calculate the actual size of the diameter of the structures in micrometers. (2 marks)

f) Suggest two changes that will occur to structure Z if an athlete from a low altitude area trains in a high altitude area.

(2 marks) g) Name a mineral ion and vitamin required in the process brought about by structure labeled X. (2 marks)

3. You are provided with specimen G. Using a pestle and mortar, crush the specimen with distilled water to make a suspension.

a) Using reagents provided, carry out food tests. Record your observation and results in the table below. (9 marks)

Food substance	Procedure	Observation	Conclusion

b) Name the enzymes, which act on the following foods in the duodenum

i) Proteins . (1 mark)

ii) Starch. (1 mark)

NYERI COUNTRY JOINT ASSESSMENT
Kenya Certificate of Secondary Education

BIOLOGY
Paper 1

Time: 2 Hours

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1. How does movement in plants differ from that of animals ? (1 mark)
2. State **one** function of DNA molecule. (1 mark)
3. **a)** What is the function of the objective lens in a light microscope ? (1 mark) **b)** Give **one** advantage of using a light microscope over that of the electron microscope. (1 mark)
4. Akol observed and drew an amoeba using a light microscope. If the total magnification of the amoeba was X450 and that of the objective lens was X30. What was the magnification of the eyepiece lens ? Show your working. (2 marks)
5. State **three** functions of cuticle found in plant leaves. (3 marks)
6. **a)** Name the clinical condition that results due to deficiency of insulin in human body. (1 mark) **b)** How can one find out from a sample of urine whether a person is suffering from the condition named in (a) above.

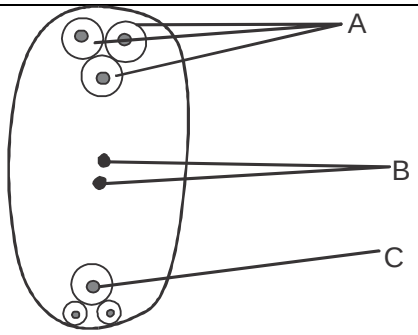
   (2 marks)

7. **a)** Which kingdom does each of the following organisms belong ?
   i) Paramecium ..... (1 mark) ii) Liverwort ..... (1 mark)

   b) Name the taxon that has closely related interbreeding organisms. (1 mark)

8. **a)** State **two** ways in which meiosis is important during sexual reproduction. (2 marks) **b)** At what stage do chromatids separate during meiosis ? (1 mark)
9. Why is locomotion important to animals ? (3 marks)
10. **a)** Where does glycolysis take place in a cell ? (1 mark) **b)** Name the compound formed during glycolysis. (1 mark) **c)** If oxygen is absent in a cell, what products are obtained in :
    i) Animals (1 mark) ii) Plants (1 mark)

11. Which part of the brain is responsible for :
    a) Controlling the rate of breathing (1 mark)
    b) Detecting changes in internal temperature (1 mark)
12. Explain why the following characteristics are essential to living organisms:
    a) Respiration (1 mark)
    b) Reproduction (1 mark)
13. The diagram below shows the structure of a mature embryosac.

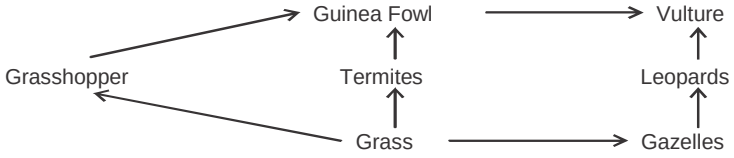


a) Name the structures labelled : A ,B (2 marks)
b) What does structure **C** transforms after fertilization ? (1 mark)

14. a) What prevents blood in veins from flowing backwards ? (1 mark)
b) State **three** ways in which the red blood cells are structurally adapted to their function. (3 marks)

15. i) Give **two** examples of sex linked trait in humans on Y-chromosome. (2 marks
ii) Colour blindness is a sex linked trait that is more common in males that in females. Explain. (2 marks)

16. The diagram below shows a feeding relationship in an ecosystem. Study it and answer the questions that follow.

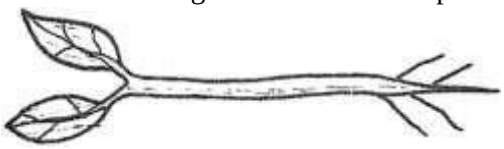


a) Name the organisms through which natural energy enters the ecosystem. (1 mark)
b) In what trophic level are the leopards ? (1 mark)
c) What would be the short term effect of introducing caterpillars and locusts in the ecosystem ? (1 mark)
d) Explain why excessive use of pesticides may affect soil fertility. (1 mark)

17. a) Name the tissue that is responsible for secondary thickening in plants. (1 mark) **b)** Explain how the tissue named in (a) above gives rise to secondary xylem and secondary phloem. (3 marks)

18. a) Birds have beaks which are structurally modified to different modes of feeding.
i) What is the name given to such structures in evolution ? (1 mark) ii) What is the name given to the evolution of the beaks of birds ? (1 mark) **b)** State the roles of Lamarck's theory of evolution. (2 marks)

19. In an experiment, a seedling was placed horizontally in the dark for three days as shown in the diagram below.
a) Draw the diagram of the same seedling at the end of the experiment. (1 mark)



b) Explain the response exhibited by the shoot in the diagram you have drawn in (a) above. (3 marks)

20. State **two** adaptations of xylem vessels to their function. (2 marks)

21. a) Give the main functions of muscles found along the gut. (2 marks)
b) Give the function of roughage in a human body. (1 mark)

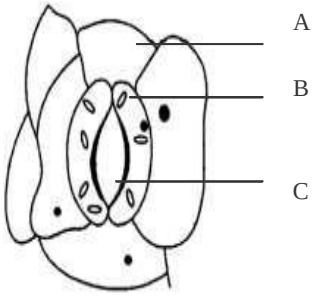
22. Name the tissue that carries out the following function in mammals.

i) Transports oxygen throughout the body. (1 mark) ii) Supports the animal's body off the ground. (1 mark) iii) Transmits impulses from one part of the body to another. (1 mark)

23. a) Name the process by which urea is removed from the blood in the kidney. (1 mark)

b) Name **three** excretory products released by human skin. (3 marks)

24. Study the diagram and answer the questions that follow.



i) Name cells **A** and **B** (2 marks)

ii) Name two ways in which cell **B** is adapted to its function. (2 marks)

25. a) Name **two** membranes that materials from outside the cell will have to pass through before they enter into a sap vacuole. (2 marks)

b) Explain why the number of red blood cells decreases when placed in a hypotonic solution. (2 marks)

26. a) What is the importance of the following in an ecosystem ?

i) Decomposers (1 mark) ii) Predation (1 mark)

b) Give a reason why two species in an ecosystem cannot occupy the same niche. (1 mark)

c) Name the bacteria found in root nodules of leguminous plants. (1 mark)

NYERI COUNTRY JOINT ASSESSMENT

Kenya Certificate of Secondary Education

BIOLOGY

Paper 2

Time: 2 Hours

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1. a) What is meant by the term sex linked genes ? (1 mark)

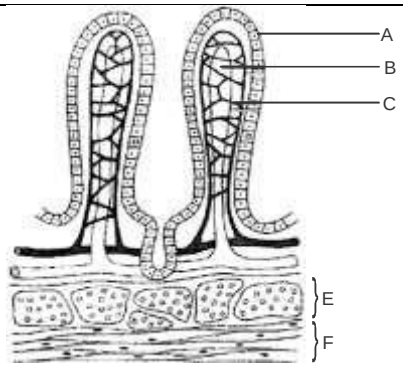
b) Haemophilia is a sex linked genetic condition transmitted through a recessive gene on X-chromosome. The normal gene may be represented by X^H.

i) What is the genotype of haemophiliac female ? (1 mark)

ii) A woman who is a carrier for haemophilia gene marries a haemophiliac man. Work out the probability that their daughter will be haemophiliac. (4 marks)

c) Give **two** reasons why Drosophila melanogaster (Fruit fly) are considered suitable organisms for use in genetic experiments. (2 marks)

2. The diagram below is a cross section through a part of human ileum.



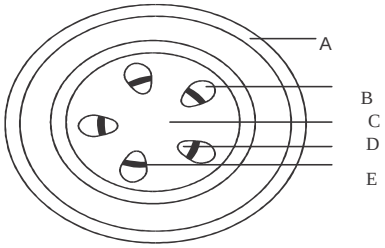
a) i) Identify the structure drawn above. (1 mark) ii) State the significance of the structure shown above. (1 mark)

b) Name the parts labelled **A**, **B** and **C** **(3marks)**

c) Give the functions of the part labelled **B** and **C.** (2 marks)

d) State the function of goblet cells. (1 mark)

3. The diagram below represents a transverse section of a young stem.



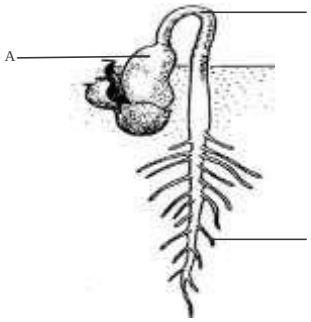
a)Name the parts labelled **A** and **C** on the diagram. (2 marks)

b) State the functions of the parts labelled **B**, **D** and **E (3 marks)**

c) List **three** differences between the section shown above and one that would be obtained from the root of the same plant. (3 marks)

4. The diagram below represent a seedling.

B



C

a) Name the structure labelled **B** (1 mark)

b) State the functions of the parts labelled **A** and **C** (2 marks)

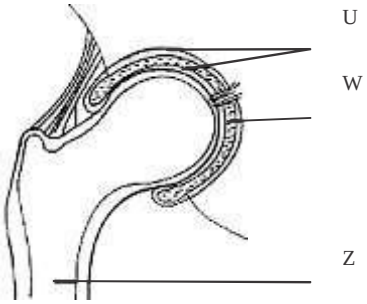
c) Name the type of germination exhibited by the seedling. (1 mark)

d) State **three** conditions within the seed necessary for germination. (3 marks)

e) What is the importance of optimum temperature in seed germination ? (1 mark)

5. The diagram below represents one of the joints in the mammalian skeleton.

a) Name the type of joint shown in the diagram. (1 mark)
b) Name the parts labelled **Z** and **U (2 marks)**
c) Name **two** parts at the body where this type of joint is found. (2 marks)
d) State the functions of the fluid found in **W**. (2 marks)
e) Name the structure which attaches muscles to the bones at a joint. (1 mark)



SECTION B : (40 MARKS)
Answer question 6 (compulsory) and either question 7 or 8 in the spaces provided after question 8

6. In an investigation, two persons A and B took the same amount of a meal rich in carbohydrates. Their blood sugar levels were immediately determined and thereafter at intervals. The results were as shown in the table below.

Time (minutes)	Glucose level in blood (mg/100cm^3)	
	Person A	Person B
0	92	80
15	90	76
30	105	90
40	116	105
60	140	162
80	138	210
120	100	202
135	96	194
160	90	180
180	90	162

a) On the grid provided, plot graphs of glucose level in blood against time on the same axes. (7 marks)
b) i) When was the blood glucose level of person **A** equal to that of person **B**. (1 mark) ii) What was the concentration of glucose in the blood of **A** and **B** at the 20th minute ? (2 marks) **c)** i) Account for the blood sugar level in person **A** and **B** between 0 and 15. (2 marks)
ii) In man, the normal blood sugar level is about 90mg/100cm^3 of blood. Explain the change in the blood sugar level in person **A** between 15 and 60 minutes. (4 marks) **d)** i) Suggest a possible reason for the high blood sugar level in person **B**. (2 marks) ii) How can the high sugar level in person

B be controlled ? (1 mark) **e)** Name the compound that stores energy released during oxidation of glucose. (1 mark) **7. a)** Describe the adaptations of wind pollinated flowers. (5 marks) **b)** Explain how the mammalian male reproductive system is adapted to perform its functions. (15 marks)

8. a) Describe the way by which terrestrial plants are adapted to living in arid and semi-arid ecosystems. (10 marks) **b)** Explain how various human activities cause soil pollution. (10 marks)

NYERI COUNTRY JOINT ASSESSMENT

Kenya Certificate of Secondary Education

BIOLOGY
Paper 3

Time: 2 Hours

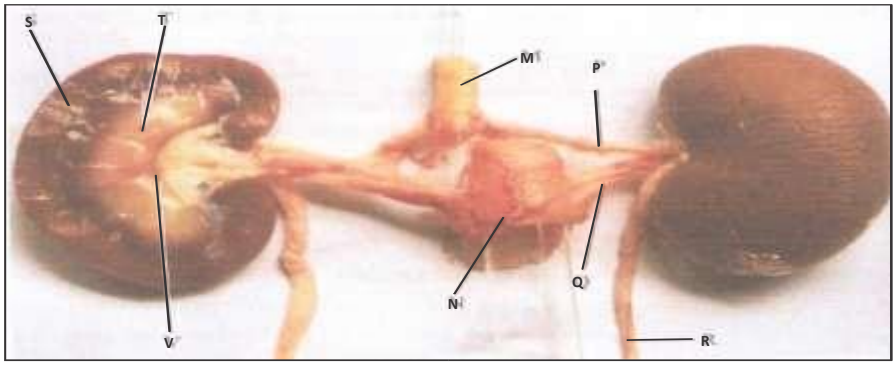
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1. You are provided with specimen **Q**, Benedict's solution, sodium hydroxide solution, 0.01% DCPIP and copper (II) sulphate solution.

a) Make a transverse section of specimen **Q** and make a large labelled drawing. (3 marks)
b) Name the type of placentation. (1 mark)
c) Name the agent of dispersal. (1 mark)
d) State **three** ways in which the specimen is adapted to its dispersal by the agent named in (c) above. (3 marks)
e) Squeeze a little juice from specimen Q is a beaker. Add an equal amount of water. Use the given reagents and test for the food substances in the specimen. Record your results in the table below. (6 marks)

Food Tested	Procedure	Observation	Conclusion

2. The photographs below shows a pair of mammalian organs with their blood supply. One of the organs has been sectioned longitudinally. Examine them.



a) Identify the pair of organs. (1 mark)
b) i) Name the blood vessels labelled **M**, **P** and **Q** **(3 marks)**
ii) Which of the blood vessels **P** and **Q** carries blood with a higher concentration of urea ? Give a reason for your answer.

Blood vessel (1 mark)

Reason (1 mark)

c) Name the structures labelled R and state its function.

Name . (1 mark)

Function . (1 mark)

d) i) Name the parts labelled **S** and **T** (2 marks)

ii) Name **two** parts of the nephron found in the part labelled **S**. (2 marks)

3. You are provided with potato cylinders, a scapel blade, solutions **A** and **B**, tissue paper and a ruler.

Chip off one end of each cylinder. Starting from the chipped end, measure exactly 3cm long and cut the cylinder. Repeat this to obtain six cylinders. Record their original / initial lengths in the table provided below.

Place three cylinders in solution **A** and the other three in solution **B**. Allow the pieces to remain in the solution for 45 minutes.

a) Remove the cylinders from the solutions, dry them using the piece of tissue paper provided and measure their lengths.

Record the final lengths and the averages in the table below. (4 marks)

Length in cm	Original / initial length in cm	Final length after 45 minutes in cm	Average
Solution A	3		
	3		
	3		
Solution B	3		
	3		
	3		

b) Account for the results in (a) above:

i) In solution **A** (3 marks) ii) In solution **B** (3 marks)

c) i) What would happen if potato cylinders in solution **A** had been boiled ? (1 mark)

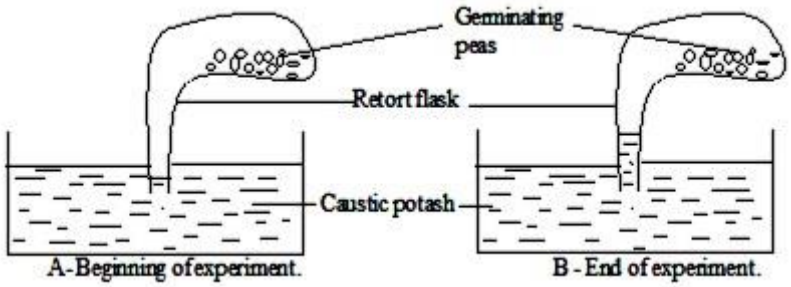
ii) Give a reason in your answer in c(i) above. (1 mark)

d) State **two** importances of the physiological process being investigated. (2 marks)

KIRINYAGA WEST SUB-COUNTY EFFECTIVE '40' EXAMINATION

kenya certificate of secondary education
231/1
BIOLOGY
PAPER 1
TIME:HOURS.

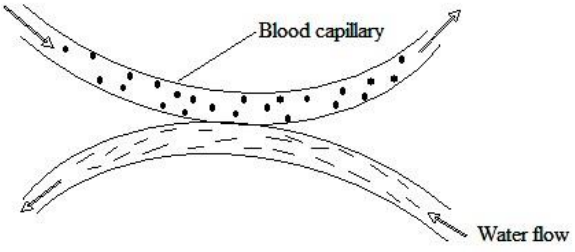
1. Give **two** reasons for studying Biology. (2 marks)
2. Why does food stored in a refrigerator remain unspoiled longer than it does under ordinary conditions? (1 mark)
3. State **one** use for each of the following apparatus in the study of living organisms.
   (a) Hand lens. (1 mark)
   (b) Pair of forceps. (1 mark)
4. The diagram below shows an experiment on germination peas.



A- Beginning of experiment. B - End of experiment.

   (a) (i) What changes are observable at the end of the experiment? (1 mark)
   (ii) Give the reason the observation in a(i) above. (2 marks)

   (b) If water had been used instead of caustic potash in the experiments, what would be observed? (1 mark)
5. State **three** sites of gaseous exchange in mesophytes. (3 marks)
6. List the main characteristics of kingdom monera. (3 marks)
7. The diagram below illustrate the flow of blood and water within the respiratory surface in fish.



   (a) Name the term used for this arrangement. (1 mark)
   (b) Explain the significance of the arrangement. (2 marks)
8. (a) State **two** roles of DNA molecule. (2 marks)
   (b) Give two nitrogenous bases in a DNA molecule. (2 marks)
9. Distinguish between;

(a) Single and double circulatory system. (2 marks)

(b) Blood plasma and serum. (2 marks)

10. The table provided below shows stomata distribution on leaves A and B and their surface area.

	Leaf surface	A	B
Number of stomata	Upper surface	25	5
	Lower surface	0	18
Surface area		25 cm^2	18 cm^2

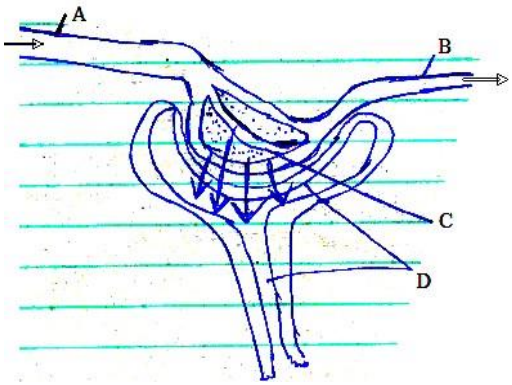
(a) Identify the habitats of the plant from which leaf A was obtained. (1 mark)

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

11 (a) Distinguish between analogous and homologous structures. (2 marks)

(b) What is adaptive radiation? (2 marks)

12. The diagram below shows a part of nephron. Study it and answer the questions that follow.



(a) Name the parts labelled A and B. (2 marks)

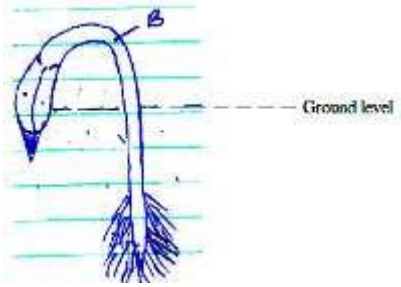
(b) Name the process by which the fluid found in D is formed. (1 mark)

13. With a reason, name the organelles that would be found in large numbers in cell of secretory glands. (2 marks)

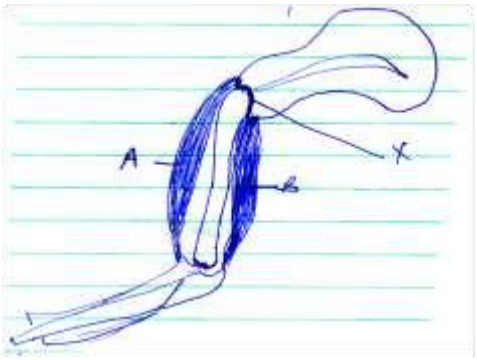
14. State three adaptations of red blood cells to their functions. (3 marks)

15. Give **three** prevention measures of cholera. (2 marks)

16. The diagram below shows a germinating seedling.

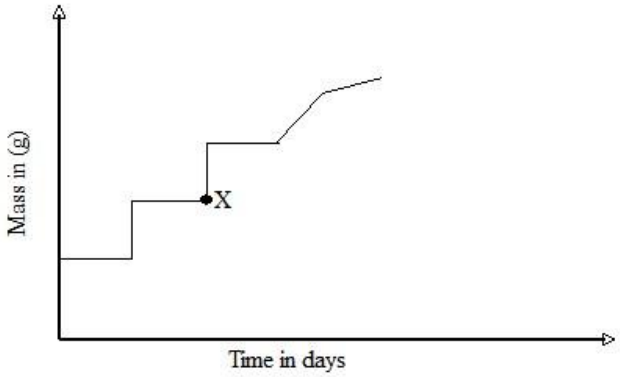


(a) Name the part of the seedling labelled B. (1 mark)
(b) State the type of germination exhibited above. (1 mark)
17. What are the structural units of lipids? (2 marks)
18. State the importance of the following features in gaseous exchange;
(i) The presence of cartilage in trachea and bronchi. (1 mark)
(ii) Alveoli, gill filaments and tracheoles being numerous in the respective organisms where they occur. (1 mark)
19. Study the diagram below and answer the following questions.



(a) Name the muscles labelled A and B. (2 marks)
(b) What happens to each muscle as the arm is straightened? (2 marks)
(c) Name the type of joint present in part labelled X. (1 mark)
20. (a) State **two** adaptation of herbivorous which enable them to digest cellulose? (2 marks)
(b) What is the importance of chewing food? (2 marks)
21. (a) Name **two** excretory processes in plants. (2 marks)
(b) Give **two** reasons why plant lack complex excretory organs. (2 marks)
22. What characteristics do mammalian lungs and the gills of bony fish have in common that enables them to exchange gases efficiently? (4 marks)

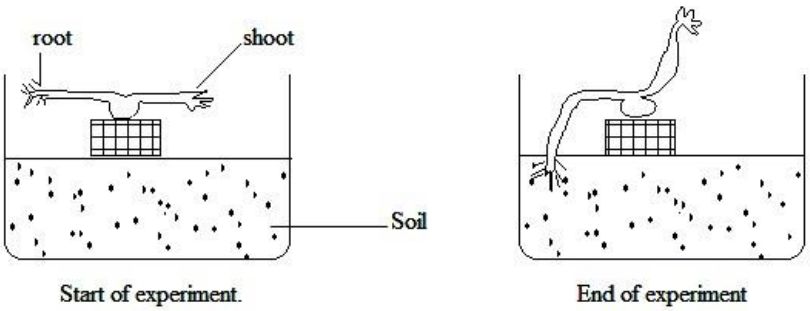
23. The graph below represents the growth in a certain phylum.



(a) Name the type of growth pattern shown on the graph. (1 mark)
(b) Identify the process represented by X. (1 mark)
(c) Name the hormone responsible for the process in (b) above. (1 mark)

24. (a) What is sex-linkage? (1 mark)
(b) Name **two** sex-linked characteristics in human determined by genes located on Y- chromosome. (2 marks)

25. An experiment was carried out to investigate the growth response in a bean seedling as illustrated in the diagram below.



(a) What type of response was being investigated. (1 mark)
(b) Explain the response exhibited by the root. (3 marks)

26. (a) Explain what happens during the dark stage of photosynthesis. (2 marks)

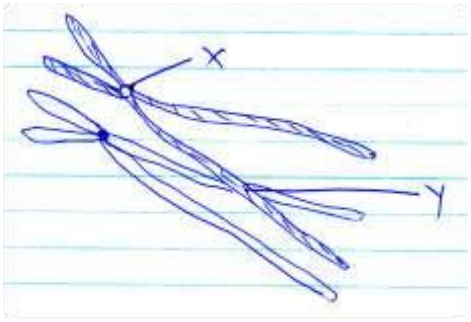
(b) Give **three** examples of complex carbohydrates. (3 marks)

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231/2
BIOLOGY
PAPER 2
TIME: 2 HOURS.

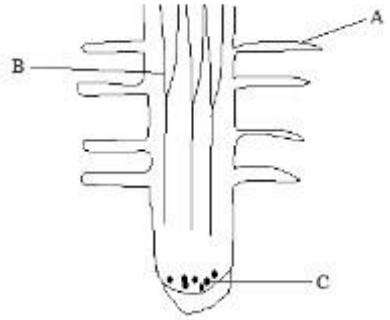
SECTION A
Answer all the questions in this section.(40 marks)

1. The diagram below shows a phenomenon which occurs during cell division.

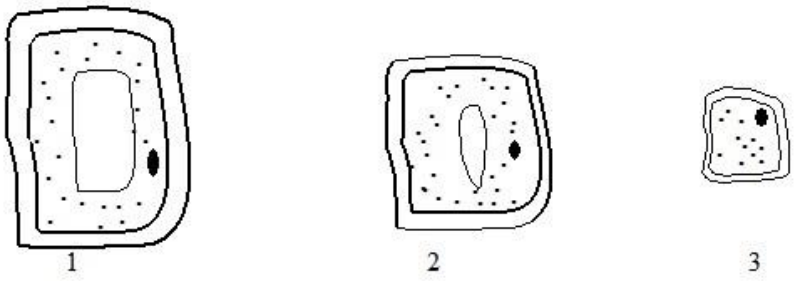


(a) Name the parts labelled X and Y. (2 marks)
(b) State the biological importance of the parts labelled X and Y. (2 marks)
(c) (i) What is meant by bivalent chromosome. (1 mark)
(ii) In which stage of cell division are the above structures likely to be. (1 mark)

2. The following diagram is a longitudinal section of the root apex.



(a) Identify the parts labeled A, B and C. (3 marks)
(b) The figure below represents three cells 1, 2 and 3.



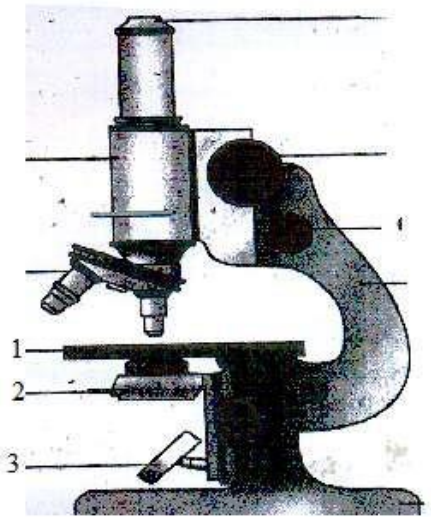
Identify the three regions of the root tip from which the cell were got from? (3 marks)

(c) Name the tissues which are responsible for growth in;

(i) girth (1 mark)

(ii) length (1 mark)

3. The figure below shows a light microscope.



(a) State the functions of the parts labelled 1, 2, and 3. (3 marks)

(b) (i) State **two** differences between an electron microscope and a light microscope. (2 marks) (ii) Give **one** advantage of using a light microscope over that of an electron microscope. (1 mark)

(c) Calculate the magnification that is obtained when an object is viewed with a X10 eye piece and a X100 objective lens.

(2 marks)

4. In an experiment, a black mouse was mated with a brown mouse. All the offsprings in F_1 generated were black. The offspring grew and were all allowed to mate with one another. The total number of F_2 generation offspring were 96.

(a) Using letter B to denote the gene for black colour, work out the genotype of the F_1 generation.(Use a punnet square)

(3 marks)

(b) State the following for the F2 generation.

(i) Genotypic ratio. (1 mark)

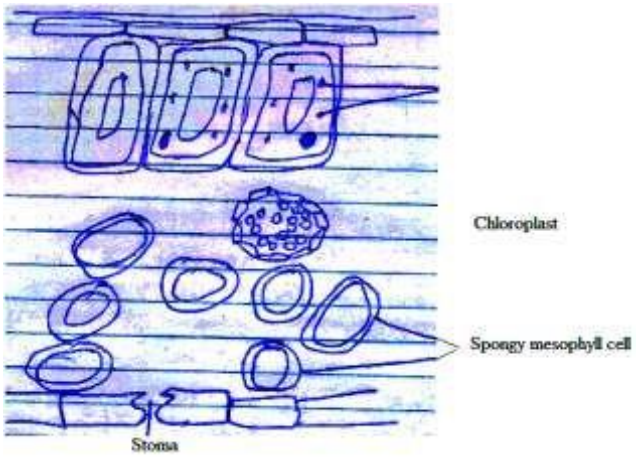
(ii) Phenotypic ratio (1 mark)

(iii) The total number of brown mice. (1 mark)

(c) (i) What is non-disjuction? (1 mark)

(ii) Give **one** example of a genetic disorder associated with non-disjunction. (1 mark)

5. The figure below shows a section through a leaf. A leaf is designed for photosynthesis and this process provides a supply of simple sugars for a plant.



(a) State the adaptation of the chloroplasts to photosynthesis. (2 marks)

(b) Name a mineral ion in chloroplast. (1 mark)

(c) (i) Name the tissues that translocates sugar from the leaves to other parts of the plants. (1 mark)

(ii) How is the tissue named in c(i) above adapted to its function? (2 marks)

(d) Write a word equation for the process of photosynthesis. (2 marks)

SECTION B (40 marks)

Answer question 6 (compulsory) and either question 7 or 8 in the spaces provided.

6. An experiment was carried out to investigate the population increase of yeast cell in a culture over a period of 48 minutes. The results were recorded as shown in the table below.

Time in minutes	Number of yeast cells
0	2
5	2
10	4
15	16
20	46
25	94
30	123
35	136
40	140
45	140
50	140

(a) Using a suitable scale. Plot a graph of number of yeast cells against time in minutes. (6 marks)

(b) (i) Determine the number of yeast cells after 24 minutes. (1 mark)

(ii) Determine the number of yeast cell after 37 minutes. (1 mark)

(c) After how long was the population of yeast cells 120? (1 mark)

(d) Account for the shape of the curve between;

(i) 0 and 12 min. (2 marks)

(ii) 17 and 30 min. (3 marks)

(iii) 31 and 45 min (3 marks)

(e) Briefly explain how any **three** factors affect population growth. (3 marks)

7. (a) State **six** common uses of excretory products in plants. (6 marks)

(b) Describe the process of excretion in the kidney. (14 marks)

8. (a) Describe how a finned fish is adapted for locomotion in water. (12 marks)

(b) Explain the movement of a molecule of water from a root hair cell to the xylem of the root. (8 marks)

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BIOLOGY
PAPER 3 (CONFIDENTIAL)

CONFIDENTIAL

1. A ripe orange (NB. Each candidate should be provided with at least $^{1}/_{2}$ a piece)
   Reagents.
2. Iodine solution.
3. Benedict's solution. 4. DCPIP
5. Two small beakers.
6. 4 test tubes
7. A test tube rack 8. Means of heating.
6. 0.1% ascobic acid

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BIOLOGY
PAPER 3 (PRACTICAL)
TIME:2 HOURS.

1. (a) Squeeze the juice from the piece of specimen B in a beaker. Using the reagents provided test for food substance in the

juice. Record your observation in the table below. (9 marks)

Food	Procedure	Observation	Conclusion

(b) Using 0.1% ascobic acid provided count the number of drops used to decolourlise 2 ml of DCPIP in a test tube. Record your observation. (1 mark)

(c) (i) Count the number of drops used to decolourlise 2 ml of DCPIP using the juice from specimen B. Record your observation. (1 mark)

(ii) Using the data collected, calculate the percentage ascobic acid present in specimen B. (2 marks)

2. The photographs below represent specimen obtained from plants. Examine the photographs.

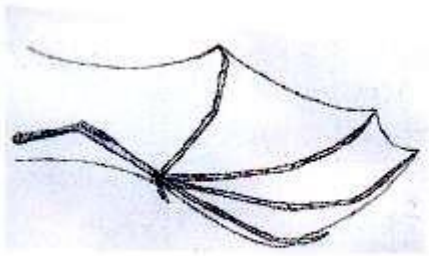
(a) In the table below name the mode of dispersal and the features that adapt the specimen(s) to the mode of dispersal. (8 marks)

Specimen	Mode of dispersal	Adaptive features
K		
M		
Q		
L		

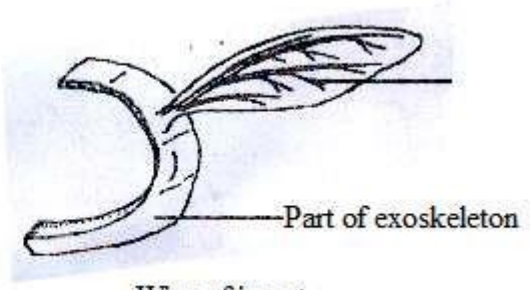
(b) Classify specimen P into its correct taxonomic unit below. (3 marks)
(i) Division.
(ii) Sub-division.
(iii) Class.
(c) Describe the type of placentation exhibited by specimen L, and give a reason for your answer. (2 marks) (i) Placentation.

(ii) Reason

2. Examine photographs shown below.



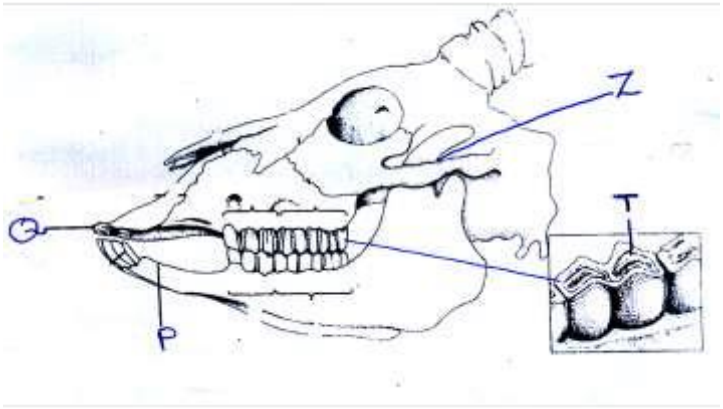
Wing of a bat



Wing of insect

Wing of a bat Wing of insect

(i) What does the origin of the wings suggest about the ancestry of the organisms? (1 mark)
(ii) This type of evolution is referred to as; (1 mark)
(iii) Give another example that illustrates this type of evolution. (1 mark)
(iv) Outline **two** differences between the two types of wings. (2 marks)
(b) The diagram below shows the lower and upper jaw of a certain mammal.



(i) Using observable features on the diagram identify the mode of nutrition for the above mammal. (2 marks)
(ii) Write the dental formulae of the above mammal. (1 mark)
(iii) Label parts marked P and Q and state the function of each. (2 marks)
(iv) Name the type of joint at part labelled Z. (1 mark)
(v) State the function of part labelled T. (1 mark)

BUSIA COUNTY JOINT EXAMINATION
KENYA CERTIFICATE OF SECONDARY EDUCATION (K.C.S.E)
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BIOLOGY
PAPER 1
TIME: 2 HRS

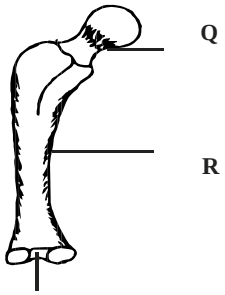
1. The reaction represented by the equation below occurs in the body.

Hydrogen peroxide $\xrightarrow{\text{Enzyme Y}}$ oxygen + water

a) Name enzyme **Y**..... (1 mark)

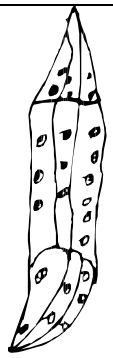
b) Name an organ in the body where the reaction occurs. (1 mark)

2. Name the type of circulatory system found in the phylum Arthropoda. (1 mark)
3. Name the organelles that perform the following function in a cell.
   i) Protein synthesis ..... (1 mark)
   ii) Transport of cell secretions ..... (1 mark)
4. How would one find out from a sample of urine whether a person is suffering from *Diabetes mellitus?* (2 marks)
5. What are the effect of gibberellins on the shoot of plants? (2 marks)
6. a) State the role of ATP molecule during active transport across the cell membrane of the plant root hair. (1 mark)
   b) List **two** factors that affect active transport. (2 marks)
7. Name the part of the microscope responsible for concentrating and directing light on the stage. (1 mark)
8. State **two** structural adaptations of the gill filaments of the bony fish. (2 marks)
9. Work out a phenotypic ratio if children of a couple with normal skin but are carriers of the albino trait. Use letter A to represent the gene for normal skin pigmentation. (4 marks)
10. The diagram below shows a bone of hind limb. Study it and answer the questions that follow.

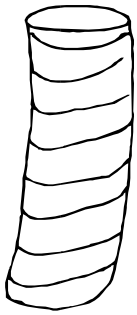


a) Name the bone ..... (1 mark)
b) Name the parts labelled **Q** and **R**. (3 marks)
c) Name the structure that articulates with the part labelled **Z** and the joint formed? (2 marks)
   Structure
   Joint .....

11. State the function of the following structures. (1 mark)
a) Fallopian tube ..... (1 mark)
b) Endometrium ..... (1 mark)
12. State the role of the cerebrum in human beings.
13. The diagrams below shows some components of xylem.



C



D

a) Identify C and D

b) Describe structural difference between the two components. (2 marks)

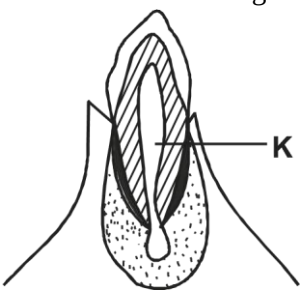
14. State **one** characteristics of a ball and socket joint. (2 marks)

15. a) Name the tissue in the stem and leaves of hydrophytes that allows them to store air for gaseous exchange.. (1 mark)

(1 mark)

b) State the function of pneumatophores. (1 mark)

16. The diagram below represents a section through a human tooth.



a) Name the type of tooth shown.....
(1 mark)

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

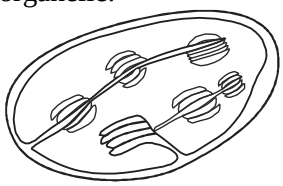
c) List and state the functions of two structures found in the part labelled **K**. (2 marks)

17. a) State Darwin's theory of natural selection. (1 mark)

b) State **two** advantages of divergent evolution to organisms. (1 mark)

c) What are vestigial organs? (1 mark)

18. Below is a diagram of an organelle.



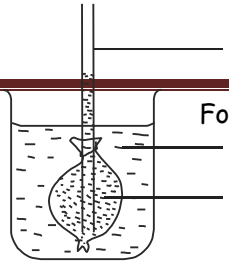
a) State the function of the organelle drawn above. (1 mark)

b) Name the parts of the organelle where:

i) Oxygen gas is produced as a by-product
(1 mark)

ii) Carbon (IV) oxide is utilized.
(1 mark)

19. An experiment was set up as shown below.



Distilled water

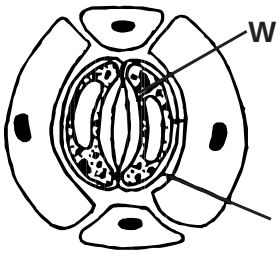
Sucrose solution

a) Suggest the observations made after 20 minutes. (1 mark)
b) Explain the observations. (2 marks)

20. a) State the role of the iris in the human eye. (1 mark)
b) Give a difference between blind spot and the *Fovea centralis.* (1 mark)

21. a) What do you understand by the term synapse? (1 mark)
b) State **one** adaptation of neuron to its function. (1 mark)

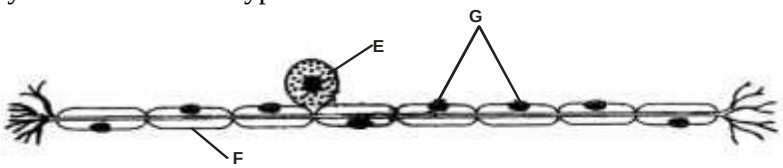
22. The diagram below shows part of a plant tissue.



X

a) Name cell labelled **X** and part labelled **W**. (2 marks)
b) State **two** adaptations of cell labelled **X** to its function.

a) Identify with a reason the type of neuron above. (1 mark)

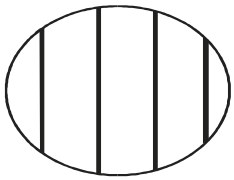


Reason (1 mark)

b) Name parts labelled E and G (2 marks)

24. Name the type of muscle found in the gut. (1 mark)

25. A form one student trying to estimate the size of onion cells observed the following on the microscope's field to view.

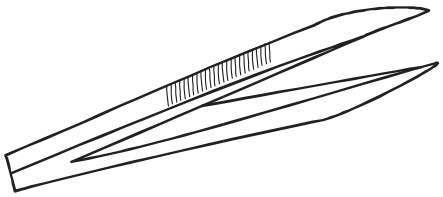


i) Name ..... (1 mark)

ii) Function (1 mark)

.....

b) Differentiate between photosynthesis and respiration. (2 marks)



If the student counted 20 cells across the field of view calculate the size of one cell in micrometers. (2 marks)

26. State **two** structural adaptations of veins to their function. (2 marks)

27. Identify the following apparatus and state it functions.

Photosynthesis	**Respiration**
(i)	(i)
(ii)	(ii)
(iii)	(iii)

29. Describe the physiological process that help in regulation of the body temperature in man on a hot day. (3 marks)

30. State **two** advantages of metamorphosis to the life of an insect. (2 marks)

31. Name causative agent of each of the following diseases. (3 marks)

i) Pneumonia ii) Whooping cough

32. a) What is polysepalous flower. (1 mark)

b) How is a sugarcane flower adapted to wind pollination? (2 marks)

BUSIA COUNTY JOINT EXAMINATION

KENYA CERTIFICATE OF SECONDARY EDUCATION (K.C.S.E)

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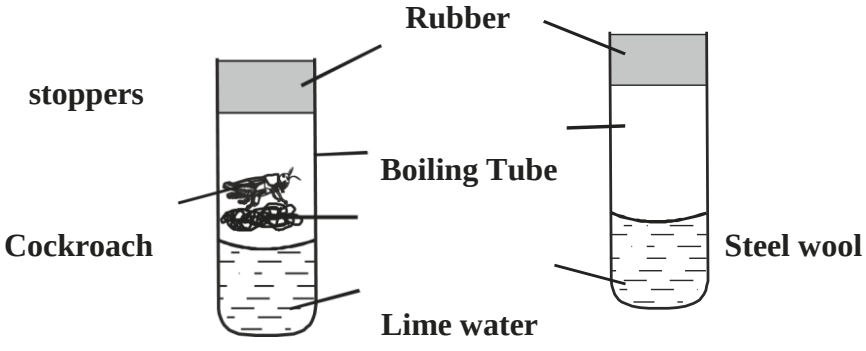
BIOLOGY

PAPER 2

SECTION A (40 MARKS)

Answer ALL questions in this section

1. A student setup the following apparatus to investigate a physiological process in animals. The set-ups were then left for one hour.



a) What was the aim of the experiment? (1 mark)

b) i) What observation was made in: (2 marks)

Tube A Tube B

ii) Account for the change that occurs in Tube A. (2 marks)

c) State the role of Tube B in the above experiment. (1 mark)

d) Explain what would be observed if a green leaf was introduced in Tube A in place of the cockroach then set-up exposed to light for one hour. (2 marks)

2. When pure breeding red flowered plants were crossed with pure breeding white flowered plant, the offspring were all pink flowered.

a) Using letter R to represent the gene for red coloured flower plants and W for the gene for the white flowered plants.

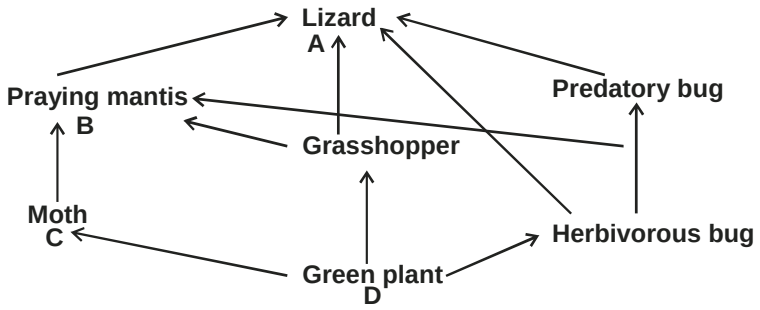
Workout the genotypic ratio of F2 generation. (5 marks)

b) State the phenotypic ratio of F2 generation. (1 mark)

c) i) What is the name given to a condition when two alleles in heterozygon state contribute equally to the phenotype of an organizations. (1 mark)

ii) Give an example of a trait in human beings where the above condition in c(i) above express itself. (1 mark)

3. Study the diagram below and use it to answer the questions below.



a) i) What name is given to this diagram..... (1 mark)

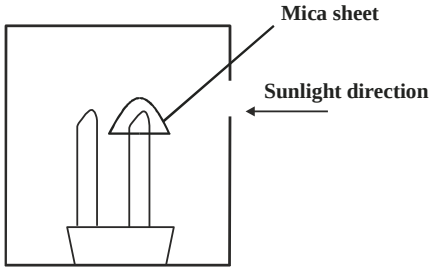
ii) Name the organism with the largest biomass..... (1 mark)

iii) Name the organism with the largest number of prey ..... (1 mark)

b) State the feeding levels of organelles labelled A, B, C and D. (4 marks)

c) State three adaptations of the grasshopper that would help protect it against the lizard. (3 marks)

4. The diagram below represents growing seedling which were subjected to unilateral light at the beginning of an experiment.



a) i) State the result of P and R. (2 marks)

ii) Account for your answer in (a) (i) above. (2 marks)

b) (i) If the apical bud of seedling P was removed, what results would be expected after 5 days. (1 mark

ii) Explain your observation in above. (2 marks)

c) What is the significance of the practice in b (i) above in agriculture? (1 mark)

5. An experiment was carried out to find out the concentrations of ions in the cell sap of an aquatic plant and that of the water in the pond in which they grew.

	Concentration in	
Ions	**Cell sap**	**Pond water**
Na^{+}	50	1.2
K^{+}	49	0.5
Mg^{2+}	11	3.0
Ca^{2+}	13	1.3
Cl^{-}	101	1.3
SO_{42-}	13	0.67

a) i) Name the process by which the aquatic plant absorbs ions from the pond water. (1 mark) ii) Outline four roles of the process you have named in (a) (i) above in a mammalian body. (4 marks) b) How can the rate of uptake of ions by aquatic plants be increased. (2 marks)

c) Name the part of the cell that allows passage of ions in and out of the cell. (1 mark)

SECTION B

Answer question 6 (compulsory) and either question 7 or 8 in the spaces provided after question 8.

6. A researcher in a plant breeding farm measured the growth of pollen tube down the style of Solanum incanum flower over a period of time. He recorded his data as in the table below.

Time in microseconds	0	5	10	15	20	25	30	40	50	55	60	65	70
Length of pollen tube in micro millimetres	0.0	0.01	0.015	0.04	0.06	0.09	0.12	0.16	0.18	0.19	0.19	0.19	0.18

a) Plot a graph of length of pollen tube against time. (5 marks)

b) From your graph determine the length of the pollen tube at 22.5 microseconds. (1 mark) c) Account for the shape of the graph between;

i) 0 - 15 microseconds (3 marks)

ii) 10 - 50 microseconds (3 marks)

iii) 55- 65 microseconds (2 marks)

iv) 65- 70 microseconds (2 marks)

d) Explain what happens after the 65th microsecond in this flower. (4 marks)

7. a) Name **three** supportive tissues in woody plants. (5 marks)

b) State **three** functions of the endoskeleton. (5 marks)

c) Explain how the girdles are adapted to their functions. (14 marks)

8. a) Name **two** functional parts of the mammalian circulatory system. (2 marks)

b) Name **two** diseases of the mammalian circulatory system. (2 marks)

c) Describe water movement from the soil into a plant until it is lost to atmosphere through the leaf. (16 marks)

BUSIA COUNTY JOINT EXAMINATION
KENYA CERTIFICATE OF SECONDARY EDUCATION (K.C.S.E)
231/3
BIOLOGY
Paper 3
(Practical)

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1. You are provided with substances labeled H. Filter the substance and collect the filtrate. Filtration is expected to be completed after 25 minutes. Using the reagents provided, carry out food tests on both the residue and filtrate of substrate H and record your results in the tables below.

RESIDUE

Food substance	Procedure	Observation	Conclusion

(8 marks)

FILTRATE

Food substance	Procedure	Observation	Conclusion

2. You are provided with a specimen labeled K.

a) Make a transverse section through specimen K and draw a labeled diagram. (4 marks)

b) State the magnification used ……..
(1 mark)

c) Name the part of plant the specimen K provided is (1 mark)

d) Give one reason for your answer in (c) above. (1 mark)

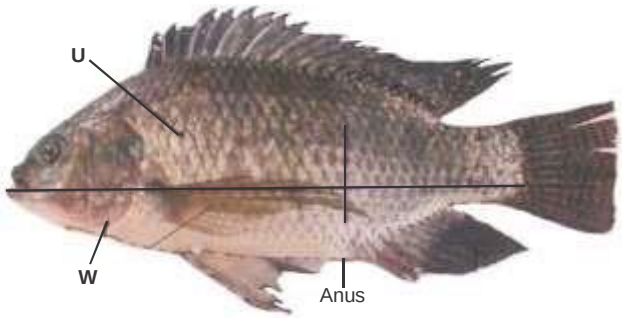
e) i) Using one of the reagents provided determine the type of vitamin present in specimen H above.
Name of vitamin ..... (1 mark)

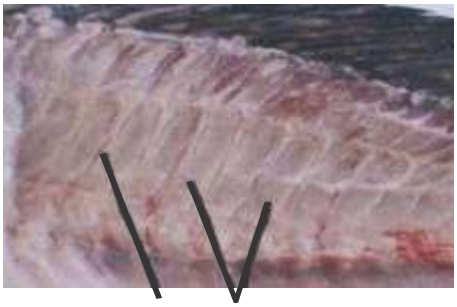
ii) Name the deficiency diseases for the vitamin in (e) (i) above. (1 mark)

f) i) Give the identity of specimen H. ..... (1 mark)

ii) Using observable reasons state the reasons for your answer in (f) (i) above. (2 marks)

3. Examine the photograph of a fish shown below.







a) Name the fins responsible for the following during swimming. K L

i) Balance, break and change direction. (2 marks)

ii) Prevent fish from rolling and yawing (2 marks)

b) Explain the process of gill ventilation between part labelled S to part labelled T. (4 marks)

c) State one adaptation each for the structures labelled **K** and **L**. (2 marks)

d) Name the parts labelled **U** and **W.** (2 marks)

KERICHO WEST FORM FOUR JOINT EVALUATION

Kenya Certificate of Secondary Education
231/1
BIOLOGY
Paper 1
(Theory)

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1. State the name given to the study of :
   a) The cell (1 mark)
   b) Micro-organism (1 mark)

2. a) Write the dental formula of an adult human (1 mark)
   b) Name two dental diseases. (2 marks)

3. The diagram below represents a certain organism collected by a student at the sea shore.



   a) Name the class to which the organism belongs. (1 mark)
   b) Give three reasons for your answer in (a) above. (3 marks)

4. Give three reasons for classifying organisms. (3 marks)

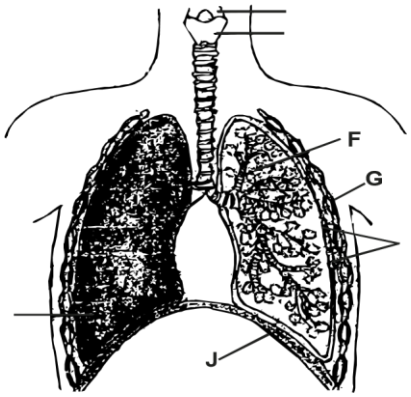
5. In an investigation, a student extracted three pieces of pawpaw cylinders using a cork borer. The cylinders were cut back to 50mm length and placed in a beaker containing a solution. The results after 40 minutes were shown in the table below.

Feature	Results
Average length of cylinders mm	56mm
Stiffness of cylinders	Stiff

a) Account for the results in the table above. (3 marks)
b) What would be a suitable control set-up for the investigation. (1 mark)

6. State three ways in which a respiratory surface is adapted to its function. (3 marks)

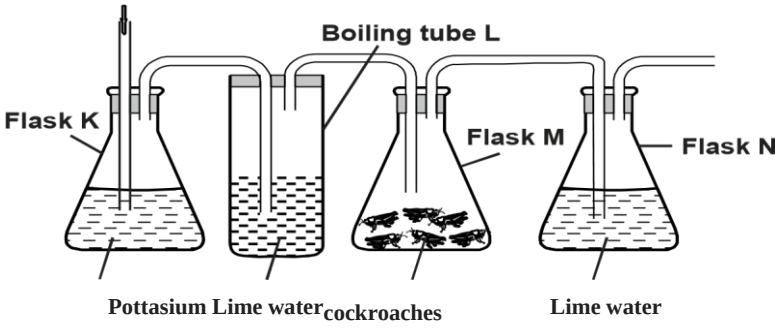
7. The diagram below represents part of the gaseous exchange system in human.



a) Name the parts labelled F and G. (2 marks)
b) State one function of each of the parts labelled H and J. (2 marks)

8. What is meant by the following terms?
   a) Ecology (1 mark)
   b) Carrying capacity. (1 mark)

9. The diagram below represents a set-up that a students used in an investigation.



   a) Name the physiological process that was being investigated. (1 mark)
   b) State the role of potassium hydroxide in a flask K. (1 mark)
   c) Account for the observation in boiling tube L and flask N (2 marks)

10. The diagrams below illustrate the organs of some flowering plants.

A B



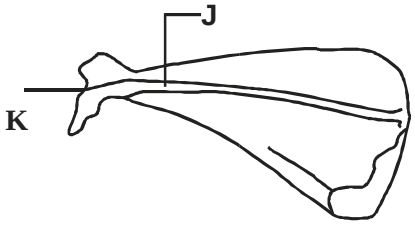
State the classes of plants to which each belong. (2 marks)

11. State the functions of the following parts of a light microscope.

a) Fine adjustment knob. (1 mark)

b) Stage (1 mark)

12. The diagram below represents a bone obtained from a mammal.



a) Name the bone (1 mark) b) Name the

i) Bone which articulates with the bone named in (a) above at the cavity labelled K.

(1 mark) ii) Joint formed by the two bones.

(1 mark) c) State the function of the part labeled J.

(1 mark)

13. State the importance of divergent evolution to organisms. (2 marks)

14. Explain why it is not advisable to be in a poorly ventilated room with a burning charcoal stove. (3 marks) **15.** The diagram below represents a certain plant.



a) What is the likely habitat for the plant? (1 mark)

b) Give two reasons for your answer in (a) above. (2 marks)

16. Give reasons for carrying out the following procedures when preparing temporary wet mounts of plant tissues.

a) Making this plant sections. (1 mark)

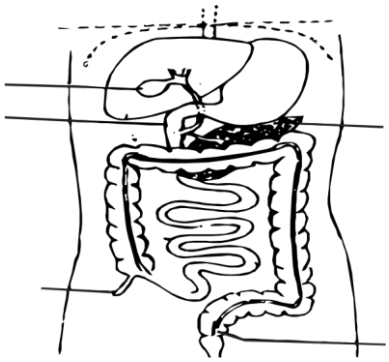
b) Adding water on the plant section. (1 mark)

c) Placing cover slip over the plant section. (1 mark)

17. Name three mechanisms that ensure cross pollination takes place in flowering plants. (3 marks)

18. Name two substances that leave the foetal blood through the placenta. (2 marks)

19. The diagram below represents a part of the human digestive system.



a) Name the organs labelled L and M (2 marks)

b) i) Name the substances produced by the organ labelled K. (1 mark)

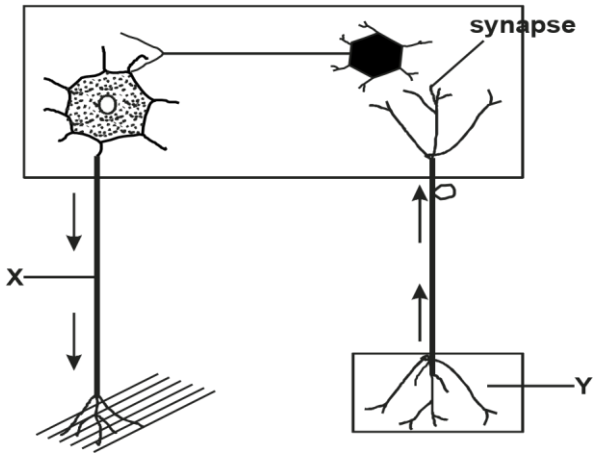
ii) State the function of the substances named in b(i) above. (1 mark)

20. Name the flower part that produces gametes. (1 mark)

21. Name support tissues in plants that is not thickened with lignin. (1 mark)

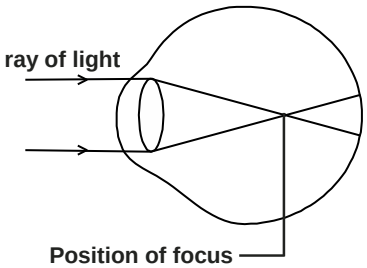
22. Explain why plants do not require specialised excretory organs. (4 marks)

23. The diagram below represents a reflex arc in human.



Name the parts labelled X and Y. (2 marks)

24. The diagram below illustrates a defect in the eye.



Explain how the defect illustrated above can be corrected. (2 marks)

25. a) Differentiate between the following terms.
i) Dominant gene and recessive gene. (1 mark) ii) Continuous variation and discontinuous variation. (1 mark)

b) What would be expected results from a a test cross? (2 marks)

26. Explain what happens in human when the concentration of glucose in the blood decreases below the normal level. (3 marks)

27. State two differences between open and closed circulatory systems. (2 marks)

28. State four reasons why water is significant in seed germination. (4 marks)

KERICHO WEST FORM FOUR JOINT EVALUATION
Kenya Certificate of Secondary Education

231/2

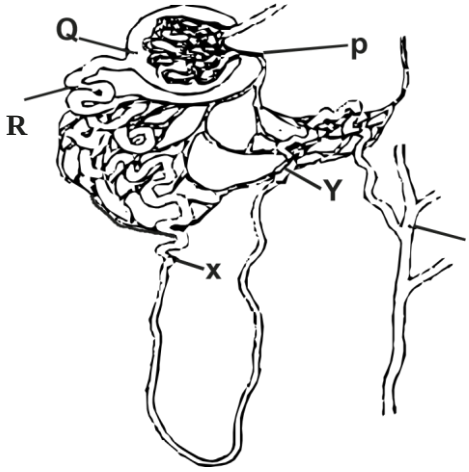
BIOLOGY ..
Paper 2

(Theory)

SECTION A : (40 marks)
Answer ALL the questions in this section in the spaces provided.

1. a) Name two reproductive hormones secreted by the pituitary gland in women. (2 marks) b) Explain how a seed is formed after an ovule is fertilized. (4 marks)
c) State two ways by which acquired immuno deficiency syndrome (AIDS) virus is transmitted. (2 marks)

2. The diagram below represents a mammalian nephron.



a) Name the;

i) Structure labelled P.
ii) protion of nephron between x and y. (2 marks)
b) Name the process that tkaes place at point Q. (1 mark)
c) Name one substance present at point R but absent at point S in a healthy mammal. (1 mark)
d) The appearance of the substance you have mentioned in (c) above is a symptom of a certain disease caused by a hormone deficiency. Name the (2 marks)
i) disease
.....
ii)
hormone.....
..

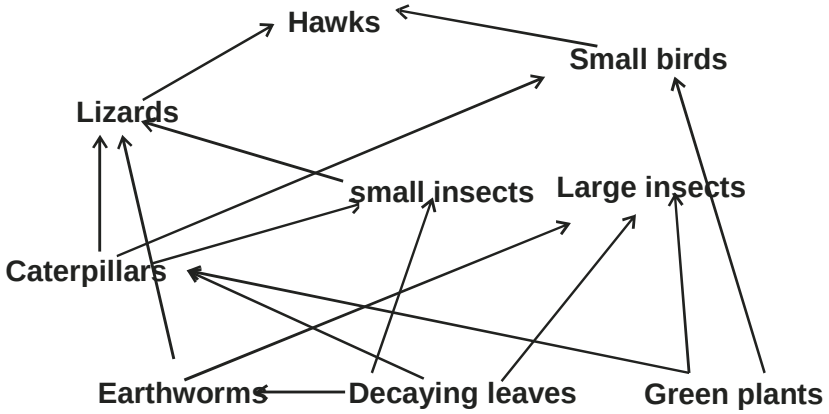
e) State the structural modification of nephron in the desert mammals. (2 marks)

3. a)Mwalimu Andrew of Mwisho wa Lami High school quarrels with his wife Fiolina over the identify of their child. Andrew is heterozygous blood group A and Fiolina is homozygous blood group B. The child born is of blood group O. Andrew has sued Fiolina for divorce over infidelity. Does Andrew have a chance of winning the case? Show your working. (4 marks_)

b)A transmission of Rh^{+ve} blood was given to a patient of Rh^{-ve} blood. After one week a similar transfusion was given to the same patient. What was likely to be the effect of the second transfusion? (2 marks)

c) State two consequences of gene mutations. (2 marks)

4. The diagram below represents a food web in a certain ecosystem.



a) Name the trophic level occupied by each of the following: (2 marks)
i) Caterpillar .....
ii) Small insects .....
b) From the food web, construct two food chains which end with lizards as tertiary consumer. (2 marks)
c) i) Which organisms have the least biomass in this ecosystem? (1 mark)
ii) Explain the answer in c(i) above. (3 marks)

5. a) A shoot of seedling exposed to light on one side bends towards the source of light as it grows.
i) Name the response exhibited by the shoot of the seedling. (1 mark)
ii) Explain how the bending towards the source of light occurs. (3 marks)
b) A person was able to read a book clearly at arm's length but not at normal readings distance;
i) State the defect the person suffered from ? (1 mark)
ii) What was he unable to read the book clearly at normal distances? (2 marks)
iii) How can the defect be corrected? (1 mark)

SECTION B (40 marks)

Answer question 6 (COMPULSORY) and either question 7 or 8 in the spaces provided after question 8.

6. An experiment was carried out to investigate haemolysis of human red blood cells. The red blood cells were placed in different concentration of sodium chloride solution. The percentage of haemolysed cells was determined. The results were as shown in the table below.

Salt concentration (g/100cm³)(%)	0.33	0.36	0.38	0.39	0.42	0.44	0.48
Red blood cells (haemolysed)(%)	100	91	82	69	30	15	0

a) i) On the grid provided, plot a graph of haemolysed red blood cells against salt concentration. (6 marks)
ii)At what concentration of salt solution was the proportion of haemolysed cell equal to non-haemolysed cells? (1 mark) iii) State the percentage of cells haemolysed at salt concentration of 0.45%. (1 mark) b) Account for the results obtained at:

i) 0.33 percent salt concentration. (3 marks) ii) 0.48 per cent salt concentration. (3 marks) c) What would happen to the red blood cells if they were placed in 0.50 percent salt solution? (3 marks)

d) Explain what would happen to onion epidermal cells if they were placed in distilled water. (3 marks)

7. Describe the role of hormones in the growth and development of plants. (20 marks)

8. Discuss the various evidences which show that evolution has taken place. (20 marks)

KERICHO WEST FORM FOUR JOINT EVALUATION

Kenya Certificate of Secondary Education
231/3
BIOLOGY
Paper 3
(Practical)

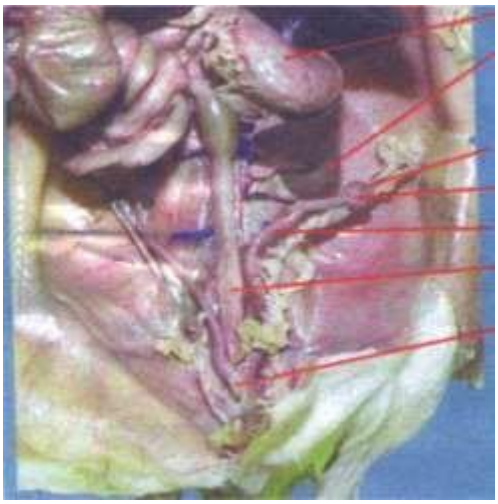
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1. You are provided with the following solutions labelled E, F, G, H and J on the table.
E - food substance
F - dilute sodium hydrogen carbonate G - dilute hydrochloric acid
H - Benedict's solution.
Source of heat.

Carry out tests using the reagents provided to determine the food substance(s) presented in solution E (14 marks)

FOOD SUBSTANCE BEING TESTED	PROCEDURE	OBSERVATIONS	CONCLUSION

2. Examine the photograph which shows parts of the urogenital system of a female rat and answer the questions that follow. The organ marked 1 is the stomach.



1

2

3

4

5

6

7

a) i) Name the organ marked 2 ..... (1 mark) ii) State two functions of the organ. (2 marks) iii) What is the functional unit of the organ named in (a) (i) above? (1 mark) b) i) Identify and name each of the organs marked 3 and 4. (2 marks) ii) State two functions of the part marked 4. (2 marks) c) i) Identify and name the organ marked 5. (2 marks) ii) Explain two functions of the organ named c(i) above. (2 marks) d) The organ marked 6 is the large intestine. State two functions of the large intestine. (2 marks)

3. Study the photographs A and B that shows part of plants in natural habitat.



A



B

a) Name the type of the plant response shown in:

i) A.....(1 mark) ii)

B.....(1 mark)

b) Explain the mechanisms of the response in

A (3 marks)

B (5 marks)

c) State the biological significance of the response to plants in

A (1 mark)

B (1 mark)

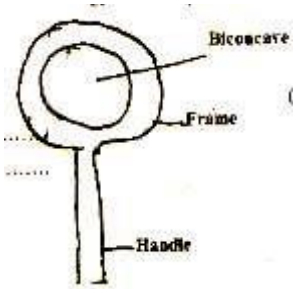
d) Suggest the nature of the habitat that plants with the type of response A grows. (1 mark)

LONDIANI SUB-COUNTY JOINT EXAMINATION

kenya certificate of secondary education

231/1
BIOLOGY
PAPER 1
TIME:2 HOURS.

1. Name the filed of science that specializes in the study of chemical changes in an organism (1 mark)
2. The diagram below show an instrument used in the Biology laboratory



Name the instrument and state its functions

Name ……

Function …….. (2 mks)

3. A couple gave birth to children with all types of blood groups. Suggest the possible genotypes of the parents (1 mk)
4. a) Nitrogen in the atmosphere cannot be directly utilized by plants. State two ways by which this Nitrogen is made available for plant use (2 mks)

b) What is the biological importance of denitrification (1 mk)

5. Explain the following statements
   i) The thyroid glands swell in some individuals (1 mk)
   ii) Lack of magnesium leads to yellowing of leaves in plants (1 mk) iii) High temperature stops enzyme action (1 mk)

6. a) Name a chemical substance required for transmission of impulse in a synapse (1 mk)
   b) State the functions of the following structures in neurone

i) Node of ranvier (1mk) ii) Myelin sheath (1mk)

7. Name the organelles that would be most likely found in large numbers in cells that perform the functions below.
   a) A cell in the ileum that actively takes in glucose (1 mk)
   b) A cell in the liver that breaks down foreign bodies (1 mk)
8. a) Name the blood vessel that connects arteries to veins (1mk)

b) State three ways in which the vessel named in (a) above are adapted to carry out their function (3mks)

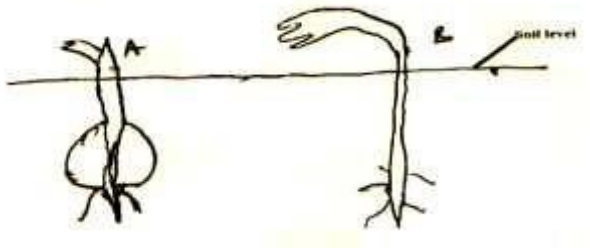
9. The number and distribution of stomata of three different leaves are shown in the table below

Leaf	Number of stomata	
	Upper epidermis	Lower epidermis
A	300	0

B	150	200
C	02	13

a) Suggest the possible habitat of the plant from which the leaves were obtained
A……. (1mk)
B……. (1mk)

10. What is meant by the following terms
    a) Habitat (1mk)
    b) Biomass (1mk)
11. The diagram represents a stage of growth and development of two different plants

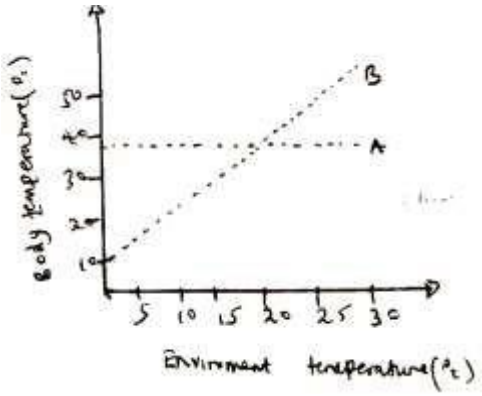


With reasons identify the types of germination shown by Plant A and B

12. A boy could clearly read a book placed 10cm away but could not identify his friend 10 metres away
    a) What eye defect was he suffering from)
    (1mk)
    b) State how the defect can be corrected (1mk)
13. Active yeast cells were added to dilute sugar solution in a container. The mixture was left in a warm room. After a few hours bubbles of gasses were observed escaping from the mixture.
    a) Write an equation to represent the chemical reaction (1mk)
    b) State two economic importance of this type of reaction (2mks)
14. a) Name the parts of a mammalian ear which carry out the following function
    i) balance and poisture (1mk) ii) hearing (1mk)

b) state two economic importance of presence of glands in auditory canal
(1mks)

15. body temperature of two animals A and B were taken over the increase in environmental temperature. The results are shown in the diagram below



    a) what name is used to describe group of animals represented
    A (1mk)
    B (1mk)

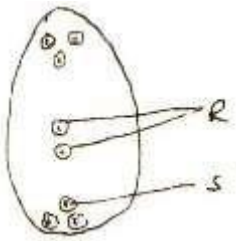
b) state two advantages of the group of animals represented by A and that of B (2mks)

16. a) name two disorders in man that occur through gene mutation (2mks)
    b) Give two advantages of polyploidy in plants (2mks)
17. the reaction represented by the equation below occurs in the body

Hydrogen peroxide $\xrightarrow{\text{Enzyme Y}}$ Oxygen + Water

a) Name enzyme Y (1mk)
b) Name an organ in the body where the reaction occurs (1mk)
c) What is the significance of the reaction (1mk)

18. a) Name two main sites of gaseous exchange in terrestrial green woody plants (2mks) b) Explain why respiratory surfaces in animals need to be thin and moist (2mks)
19. study the diagram of the embryo sac below and answer questions that follow



a) Name the type of fertilization that occurs in the embryo sac (1mk)
b) What do the structure labeled R and S develop into after feritilization (2mks)

20. Name joints formed between the
    A) Humerus and scapula (1mk)
    B) Cranial bones (1mk)
21. a) State the significance of the following in evolution
    i) accumulation of variations in organisms (1mk) ii) survival of the fittest (1mk)

b) Explain what leads to struggle for existence in organisms (1mk)

22. a) A certain animal has no incisor, no canines, 6 premolars and 6 molar in its upper jaw. In the lower jaw there are 6 incisors, 2 canines, 6 premolars and 6 molars. Write its dental formula (1mk) c) Explain how the following prevent self pollination

i) Protandry (1mk) ii) Self sterility (1mk)

23. Name one function of
    a) Progesterone (1mk)
    b) Luteinizing hormone (1mk)
24. Distinguish between diffusion and osmosis (2mks)
25. a) explain what happens when a wilting young plant is well watered (2mks) b) Name a support tissue in plants thickened with

i) cellulose (1mk) ii) Lignin (1mk)

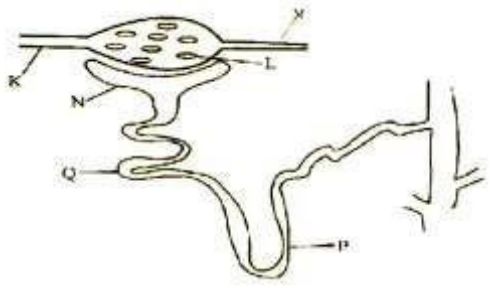
26. a) Name the plant excretory product which is used for
    i) Treatment of malaria (1mk) ii) As beverage (1mk)

b)Explain why lactic acid is not considered as an excretory product though it is toxic to tissues (1mk)

27. State functions of the following parts of the microscope
    i) Condenser (1mk)
    ii) Eye piece (1mk)
28. List any two distinguishing characteristics of the kingdom monera (2mks)
29. Other than temperature, list down three other factors that can affect the rate of enzyme catalyzed reaction (3mks)
30. What is meant by the term Binomial nomenclature (1mk)

1. **LONDIANI COUNTY JOINT EXAMINATION**
KENYA CERTIFICATE OF SECONDARY EDUCATION (K.C.S.E)
231/2
BIOLOGY
PAPER 2
TIME:2HRS

The diagram below is a functional unit of a mammalian kidney a)



b) Name the process that occurs in (2mks)
L
P

c) (i) state the structural difference between K and M (1mk)
(ii)How does the structural difference above help in the process that occurs in L (2mks)

d) State two adaptations of structure Q to its functions (2mks)

e) Explain why aquatic animals in fresh water excrete ammonia (1mk)

2. (a) What is meant by the term linked genes? (1mk)
(b) Haemophilia is a genetic condition transmitted through a recessive gene linked to X chromosome. The normal gene may be represented by XH
i) What is the genotype of the haemophilic female? (1mk)

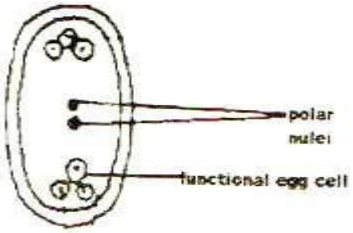
ii) A woman who is a carrier for the haemophilia gene marries a normal man. Work out ther their phenotypic ratio fo
offspring (4mks)

iii) Haemophilia is more common in males than in females. Explain this phenomenon. (2mks)

3. a) Name the plant organs in which meiosis take place (2mks)

b) Identify the figure below (1mk)

Using the diagram, explain the meaning of double fertilization in flowering plants

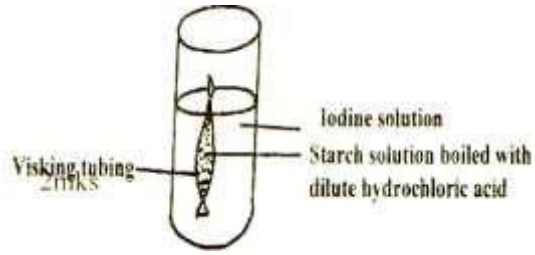


c) (1mk)

d) What happens to the structure above after fertilization (1mk)

e) State three adaptations of fruits to animal dispersal (3mks)

4. a) A group of students set up an experiment to demonstrate a certain process as shown below.



After 10 minutes the students carried out iodine test inside and outside the visiking tuning

a) state two roles of the process being investigated in animals (1mk)

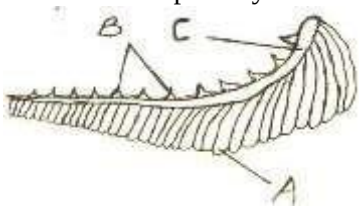
b) account for the results expected in the experiment above (3mks)

c) (i) What is the importance of plasma membrane in active transport (2mks)

(ii) Give one similarity between osmosis and active transport (1mk)

---

5. The diagram below show a respiratory structure of a bony fish



a) Name the parts labeled A, B and C (3mks)

b) What is the advantage of counter current flow system in fish over the parallel flow? (2mks)

c) How is the part labeled A adapted to its function (3mks)

Section B (40 Marks)

Answer questions 6 (compulsory) and either questions 7 or 8

6. The table below shows the relative numbers of three main species of organisms in a pond.

Depth in metres		0.00	0.50	0.75	1.00	1.25	1.75	2.00	2.50	3.00
Number of organisms in thousands	R	0	0	0	0	8	25	34	15	0
	Q	20	160	190	165	115	10	0	0	0
	P	10	25	40	53	45	18	5	2	0

a) Using the same axes, draw the graphs to show number of organisms against depth (8mks)

Graph

b) Which of the three species is widely distributed within the pond (1mk) c) Giving a reason for your answer which of the species is a producer?

Producer (1mk)

Reason
(1mk) d) At which depth are the population of the species the same? (1mk)

e) Giving a reason for your answer which of the species is a primary and secondary consumer? (4mks) Primary consumer
Reason

Secondary consumer

Reason

f) Explain two ways in which the following are adapted to their functions
i) Palisade layer (2mks) ii) Cuticle (2mks)

7. (a) (i) What is accommodation of the eye
(1mk)
(ii)Describe the accommodation of a close object by the eye (3mks)
(b) Discuss the adaptations of the human eye to its functions (16mks)

8. Discuss the various evidence of organic evolution
(20mks)

LONDIANI COUNTY JOINT EXAMINATION
KENYA CERTIFICATE OF SECONDARY EDUCATION (K.C.S.E)
231/3
BIOLOGY(PRACTICALS)
PAPER 3

CONFIDENTIAL.
Confidential instructions to schools

Each candidate requires

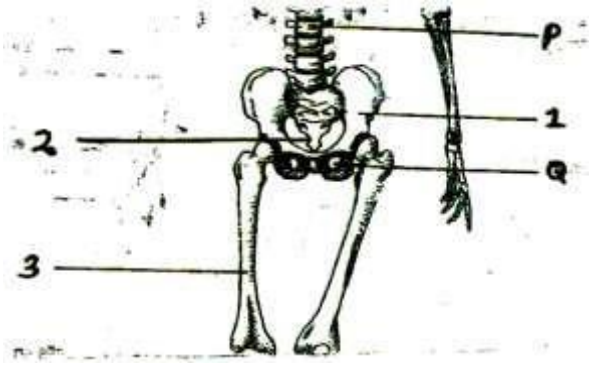
1. 10ml of solution labeled W (mixture of 10% glucose and 10% egg white)
2. 10% sodium hydroxide
3. 10% copper (ii) sulphate with a dropper
4. 10ml measuring cylinder
5. Iodine solution with a dropper
6. Benedict‘s reagent
7. Dil. Hydrochloric acid
8. Sodium hydrogen carbonates solution
9. A test tube rack
10. 5 test tubes (clean)
11. A test tube holder
12. Distilled water in a wash bottle
13. A means of heating
14. Moss plant labeled Y

LONDIANI COUNTY JOINT EXAMINATION
KENYA CERTIFICATE OF SECONDARY EDUCATION (K.C.S.E)
231/3
BIOLOGY (PRACTICALS)
PAPER 3

1. You are provided with solution W. using the provided reagents; carry our possible food tests to identify food substances
present in solution (12mks)

Food substance	Procedure	Observation	Conclusion

2. Below is a photograph obtained from the pelvic region of a human being and showing some bones of the vertebral column. Examine it carefully and answer the questions that follow.



a) Identify the bones labeled 1,2 and 3
(3mks)

b) (i) Name the type of joint formed at the proximal end of bone as 3 as it articulates with the adjacent bone
(1mk)

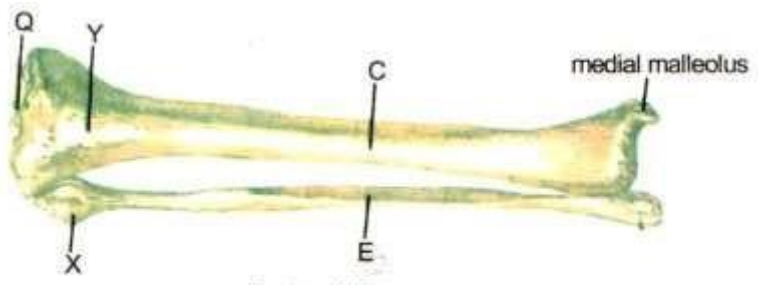
(ii) Give an observable feature on bone 3 for your answer in (b) (i) above
(1mk)

c) (i) Identify the part labeled P (1mk)

(ii)Give two functions of the part identified in (c) (i) above (2mks) d) Using observable features only, state how bone 1 is adapted to its functions (2mks)

e) (i) Identify the part labeled Q (1mk)

(ii) Give the function of the part labeled Q
(1mk) f) Photograph P below is from a mammalian skeleton



Photograph P

i) Identify bone C and E (2mks) ii) Name the bone that articulates at point Q and the type of joint formed (2mks)

Bone

Joint

3. You are provided with a specimen labeled Y
a) Identify the organism (1mk)
b) State the kingdom and division to which it belongs (2mks)

Kingdom

Division

c) How does the organism reproduce? (1mk)
d) Draw a well labeled diagram of the specimen (5mks)

LONDIANI COUNTY JOINT EXAMINATION
KENYA CERTIFICATE OF SECONDARY EDUCATION (K.C.S.E)

1.

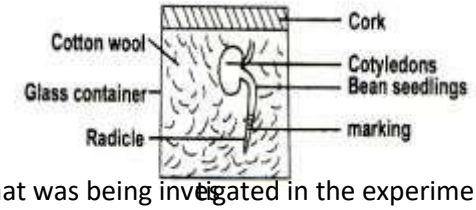
THARAKA SOUTH JOINT EVALUATION
Kenya Certificate of Secondary Education
231/1
BIOLOGY PAPER 1

1. Give two characteristics that distinguish scientific names of organisms from the ordinary names. (2 marks)
2. Identify the structure of the cell that perform the following functions: (1 mark)
   a) Synthesize ribosomes (1 mark)

   b) Regulate exchange of substance in and out of the nuclear. (1 mark)

   c) Division of cells to form new ones. (1 mark)

3. A student set up an experiment as shown in the diagram below.



Fig

   a) (i)What was being investigated in the experiment? (1 mark)

   ii.Draw a diagram to indicate the expected results of the experiment after three days. (1 mark)

   iii.Why was it necessary to have wet cotton wool in the container. (1 mark)

   b) What is the role of the following in a germinating seed. (1 mark)

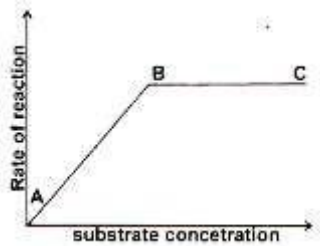
      i. Oxygen (1 mark)

      ii. Cotyledons (1 mark)

4. Name two enzymes and one ion metal that are needed in the blood clotting process. (3 marks)
5. Name the polysaccharides found in the following structures. (1 mark)
   a) Exoskeleton (1 mark)

   b) Xylem vessels (1 mark)

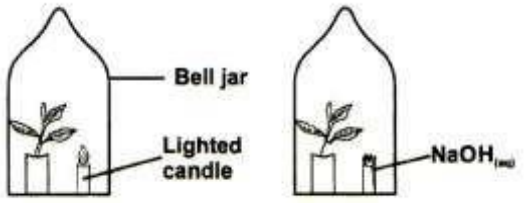
6. Outline three ways in which the gills of tilapia fish are modified to perform their functions. (3 marks)
7. The graph below shows the effect of substrate concentration and the rate of enzyme reaction.



Account for the shape of the graph between

   a) (i) (2 marks)
      i. A and B
      ii. B and C
   b) How can the rate of reaction be increased after point B? (1 mark)
8. Two potted plants A and B were placed in the dark for two days. Each was then placed in an air tight bell jar as follows then

transferred to light for four hours. Each plant was then tested for starch.



a) why were the plants put in the dark place for two days. (1 mark)
b) what was the result of the starch test in plant B.Expain your answer. (2 marks)

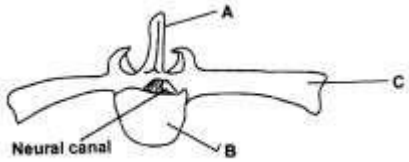
9. identify two adaptations of vertebrae neurone that affects the speed of impulse transmission. (2 marks)
10. (a)State the kingdom to which chladydomonas belong. (1 mark)

(b)An organism has the following characteristics:
- Four pairs of wings
- Cephalothorax and abdomen
- Absence of antennae
- Presence of a pair of chelicerae

Name the phylum and class that the organism belongs to?
Phylum
Class

(2 marks)

11. Study the diagram shown below of the anterior view of a lumbar vertebra of a mammal.



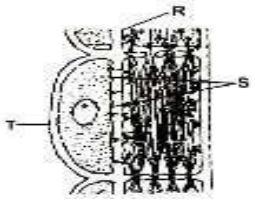
a) Name the parts labelled A and B (2 marks)
b) State the function of part C (1 mark)
12. Name the type of response shown by:
a) Leaves of *mimosa pudica* when they fold after being touched. (1 mark)
b) Euglena when it swims towards the source of light. (1 mark)
c) Maggots moving from the lit side of a boiling tube to the side painted black. (1 mark)
13. (a) Give two possible ways of establishing the genotype of an organism whose genotype is unknown. (2 marks)
(b) Euglena when it swims towards the source of light. (1 mark)
(c) Give the genotype of a male who could be born haemophiliac. (1 mark)
14. The diagram below shows a structure for gaseous exchange in class Pisces.



a) Identify the structure. (1 mark) b) State the function of the part labelled C.
c) How is the structure labelled B adapted for its function? (1 mark)

15. a)State two advantages of internal fertilization. (2 marks) b) Give reasons why a woman excretes less urea when she becomes pregnant. (2 marks)

16. The diagram below represents part of phloem tissue.



a) Name the structures labelled R and S and the cell labelled T. (3 marks)

R

S

Cell labelled T

b) State the function of the structure labelled S (1 mark)

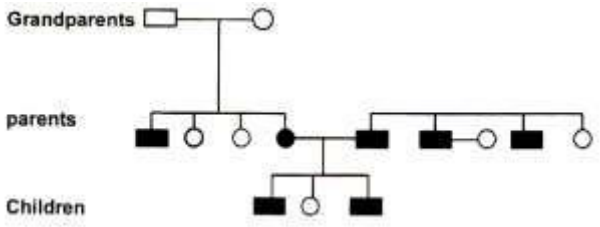
17. Distinguish between natural and acquired immunity. (2 marks)
18. a)What is the difference between Darwinian and Lamarkian theories of evolution? (2 marks) b) What is meant by the term vestigial structures? Give one example. (2 marks)
19. Name the hormone responsible for:
    a) Conversion of glycogen to glucouse (1 mark)
    b) Regulation of the amount of water in the blood (1 mark)
20. Name the substances produced as a result of anaerobic respiration in:
    i. Yeast (1 mark) ii. Human muscles (1 mark)
21. Account for the osmoregulatory changes that would take place in a marine amoeba if it was transferred to a fresh water environment. (3 marks)
22. a) What is meant by resolving power of a microscope. (2 marks)
    b) State the reason behind the addition of iodine solution, to an onion epidermis on a slide while being observed on alight microscope. (1 mark)
23. Why is excretion of nitrogenous wastes more of a problem to animals than plants. (3 marks)
24. Explain why sweat accumulates on a person‘s skin in a hot humid environment. (2 marks)
25. a)Name two kinds of nuclei found in a mature pollen grain. (2 marks) b) State what is meant by double fertilization in flowering plants. (2 marks)
26. a) State the role of active transport in animal nutrition. (1 mark)
    b) Give two factors which affect active transport. (2 marks)

THARAKA SOUTH JOINT EVALUATION

Kenya Certificate of Secondary Education
231/2
BIOLOGY PAPER 2

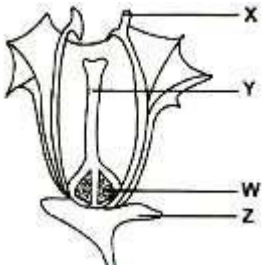
SECTION A :(40 MARKS)

1. The diagram below shows a family tree. Squares represent males and circles representfemales. Normal individuals are indicated by unshaded squares and circles. Individuals who show genetically controlled defects are indicated by shaded squares and circles.



a) What is the name given to this type of a family tree? (1 mark)
b) In which of the grandparents is the genetically controlled defects likely to have developed and by what process.
(2 marks)
c) Assume the genetically controlled defect was haemophilia,show the genotype of the following:
i. Grandparents (2 marks) ii. The two couples
iii. The children of the couple that shoed the defect. (1 mark)
iv. What are the symptoms of the defect. (1 mark)
v. What is the remedy? (1 mark)

2. The diagram below represents a flower.

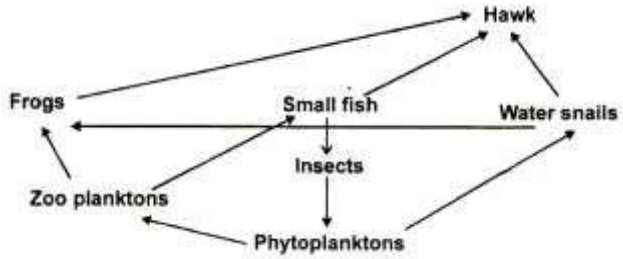


a) Name the parts labelled X and Y (2 marks)
X

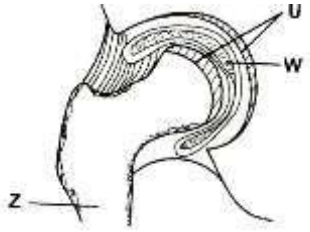
Y

b) Describe the ovary position. (1 mark)
c) i) Suggest an agent of pollination of the flower above. (1 mark) ii. Give a reason for your answer above. (1 mark) d) On the diagram above, which part do you expect to find haploid nucleus after meiosis? (1 mark)
e) In the flower above its sepals cell was found to have 20 chromosomes. What would be the number of chromosomes found in the endosperm cell of the flower embryo sac after fertilization? (1 mark) f) State one way in which flowers prevent self-pollination. (1 mark)

3. The flow chart below represents a feeding relationship in an ecosystem.

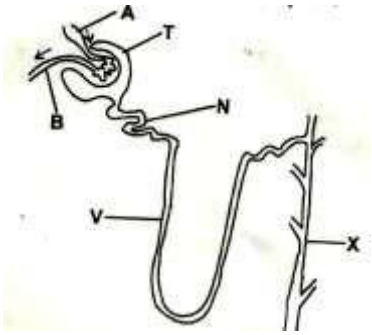


a) Name two organisms which are both secondary and tertiary consumers. (2 marks)
b) State two short term effects of immigration of insects in the ecosystem. (2 marks)
c) Name the organism which has the least Biomass in the food web. Explain. (2 marks)
d) State the role of the following in an ecosystem:
i. Saprophytes (1 mark) ii. Leguminous plants. (1 mark) e) Name one method that would be used to estimate the fish population in the ecosystem. (1 mark) 4. The diagram below represents one of the joints in the mammalian skeleton.



a) Name the type of joint shown in the diagram. (1 mark)
b) Name the parts labelled Z and U (2 marks)
c) Name two parts of the body where this type of joint is found. (2 marks)
d) State the functions of the fluid found in W. (2 marks)
e) Name the type of muscles found in the gut. (1 mark)

5. Shown below is a section through the mammalian nephron.



a) Name the structures labelled: (2 marks)

A

N

b) Name all structures in a nephron which are normally present in the cortex region of kidney. (1 mark)
c) Which region in the nephron deals with conservation of body water. (1 mark)
d) Name one hormone that has an effect on part labelled X. (1 mark)
e) How is part labelled N adapted to its function. (2 marks)

SECTION B :(40 MARKS)
Answer question6 (compulsory) in the spaces provided and either question 7 or 8 in the spaces provided after question 8

6. Carbohydrates used during respiration and those formed during photosynthesis by a certain plant was measured over a period of 24 hours at an interval of 3 hours.

Time of day	12a.m	3a.m	6a.m	9a.m	12p.m	3p.m	6p.m	9p.m	11p.m
Carbohydrates formed during photosynthesis(mg)	0	0	5	30	60	30	5	0	0
Carbohydrates used during respiration(mg)	10	10	10	10	10	10	10	10	10

Using the same axes,

a) Plot a graph of carbohydrate formed during photosynthesis and carbohydrate used during respiration against time. (8 marks) b) Calculate the net carbohydrate formed by the plant. (2 marks)

c) At what time of the day do the light compensation points occur? (2 marks)

d) Account for the shape of graph on carbohydrates. (2 marks)

i. Between 12.00a.m and 3a.m (2 marks)

ii. Between 3.00a,m to 12.00 noon (2 marks)

e) How could foggy weather influence the net amount of carbohydrates formed over the 24 hour period? (1 mark)

f) Give other external factors apart from temperature and light intensity that influence the rate of photosynthesis. (2 marks)

g) In which form are carbohydrates stored in (½ mark) i. Plant bodies

ii. Fungi (½ mark)

7. a) Describe secondary growth in flowering plants. (14 marks)

b) Describe one method that can be used to measure the average growth rate of a single leaf. (6 marks)

8. a) what is organic evolution? (2 marks)

b) Distinguish between homologous and analogous structure. (4 marks)

c) How does natural selection bring about adaptations of species to its environment. (14 marks)

Kenya Certificate of Secondary Education
231/3
BIOLOGY PAPER 3 (PRACTICALS)
SECTION A :(40 MARKS)

1. You are provided with specimen labelled M-soaked millet grains.

Grind them using pestle and mortar, adding some water to get fine solution.

Label four clean test tubes A, B, C and D.

Put about 4ml of the solution into each of the four test tubes.

a) To solution in test tube A, add some few drops of iodine. Shake the solution to mix well. Pour some little solution onto a white tile.
   i. Note down your observations. (1 mark)
   ii. Account for your observations in a(i)above. (1 mark)

b) Into solutions in test tube B, add about 2ml of Benedict's solution. Place it in a boiling water bath.
   i. After about 3 minutes, record your observations.
   (1 mark) ii. What is your conclusion from observation in b (i) above.
   (1 mark) c) For the remaining test tubes:

To test tube C, add about 3ml of solution labelled K

To test tube D, add about 3ml of solution K and about 2ml of solution labelled L Place both mixtures C and D in a water bath. Maintain the water bath at 37^0C Allow it to stand in the water bath for 30 minutes.

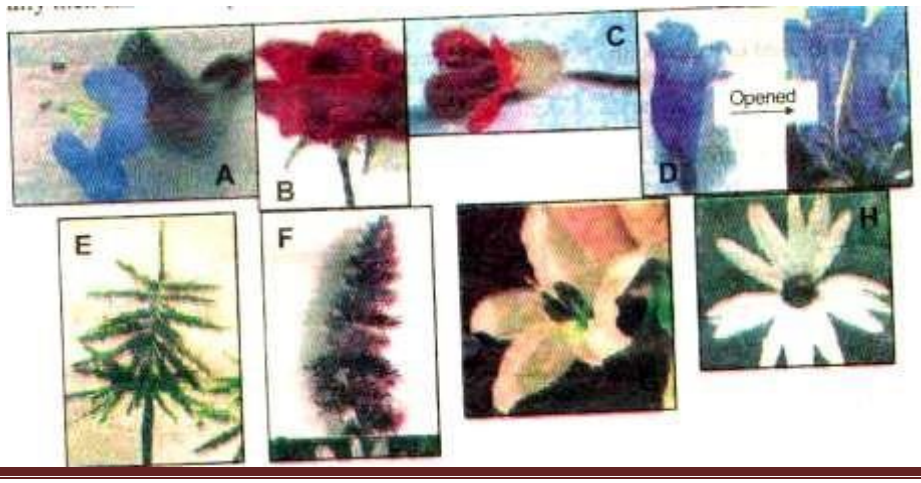
After 30 minutes, remove the test tubes. Add about 2ml of Benedict's solution to each test tube and shake well. Place the two test tubes in a boiling water bath. After about 5 minutes record your observations in the table below.

TEST TUBE	OBSERVATIONS	DEDUCTIONS
C		
D		

d) Account for your observations in the test tube C and D (2 marks)

e) i)Why was set up placed at 37^0C? (1 mark)
   ii. Suggest identity of solutions (2 marks)
   K
   L

2. You are provided with photograph of specimens labelled A, B, C, D,E,F,GandH.Study them carefully then answer the questions that follow.



1. (a)Group of florets/inflorescence…….go to2 (b)simple flowers……..go to 4
2. (a)Florets compacted into compact heads……compositae
   (b)florets not compcted but arranged in spikes……..go to3
3. (a)Florets conspicuous /purple in colour…….Amaranthacea.
   (b)Florets inconspicuous/green in colour…….Graminae
4. (a)Flower polysepalous/many free sepals……..Rosacea (b)Flower gamesepalous……..go to 5
5. (a)Flowers with more than five anthers……..Umbelliferae
   (b)Flowers with five or less anthers……go to 6
6. (a)Petals form a corolla tube/gamepetalous…mimmosacea
   (b)petals do not form corolla tube……..go to 7
7. (a)Flowers with large anthers……Solanacea
   (b)Flowers with small anthers……Ranunclulacea

Use the dichotomus key provided to Identify each specimen.In each case show in sequence the steps e.g.1(a),2(b),7(c)…..etc.in the key that you followed to arrive at the identity of each specimen. (8 marks) a)

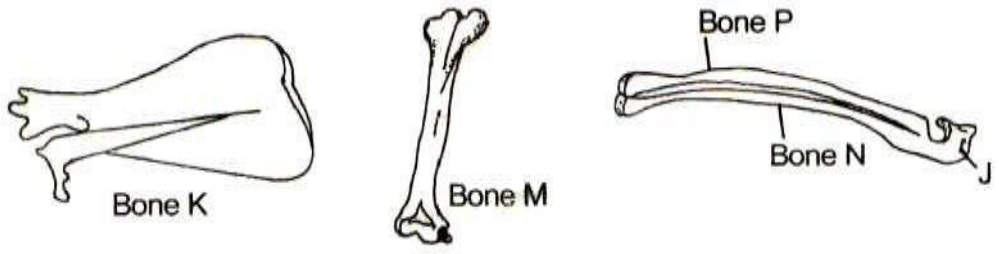
specimen	Steps followed	identity
A		
B		
C		
D		
E		
F		
G		
H		

b) (i) What is the likely agent of pollination of specimen C and E? (2 marks)
C
E

(ii) Briefly explain an adaptive feature of specimen C to the mode of pollination you have named in b(i) above (1 mark)

c) Describe the ovary of specimen B and G using the most suitable biological terms. (2 marks)
d) Supply a term used to describe the flower of specimen E and F.
(1mark)

3. The photographs below are of bones obtained from the same region of a mammal body.



a) Name the region from which bones were obtained.(1 mark)
b) Identify the bones. (4 marks)
K

N

c) State three ways by which bone K is adapted to its function. (2 marks)
d) Giving a reason, name the type of joint that would be found in the animal at the proximal and distal ends of bone N.
Proximal end (1 mark)

Reason (1 mark)

Distal end (1 mark)

Reason (1 mark) e) What is the significance of the part labelled J in the bone N?(1 mark)

f) Make a drawing to show how bones M,boneM and bone P are articulated
(2 marks) *Kenya certificate of secondary education*

GEM SUB-COUNTY JOINT EVALUATION EXAMS
Kenya certificate of secondary education (k.c.s.e)
231/1
BIOLOGY
PAPER 1
TIME: 2 HRS

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1. Name the organelle that performs each of the following functions in a cell.
a) Protein synthesis ..... (1 mark)
b) Transport of all secretions ..... (1 mark)

2. The table below shows differences in the relative concentrations of various ions in the cell sap of a sea weed (valonia) and in the sea water in which it is growing.

Ions	Relative concentrations in%	
	Valonia cell sap	Sea water
Chloride	21.2	19.6
Sulphates	0.005	3.33
Sodium	2.1	10.9
Magnesium	0.001	1.31

a) Name the process by which the following ion will enter the cell sap of the valonia cells.
i) Sulphates .....
(1 mark) ii) Chlorides
..... (1 mark)
b) Give a reason for each of your answers in (a) (i) and (a) (ii) above. (2 marks)

3. In an experiment, raw banana was peeled, mashed into a paste and was treated as shown in the set-up below.



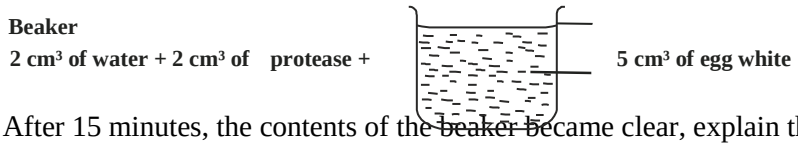
a) Name the physiological process being investigated. (1 mark)

b) State the expected colour of the solutions inside the visking tubing after 30 minutes. (1 mark)

c) Explain the observation made in (b) above. (2 marks)

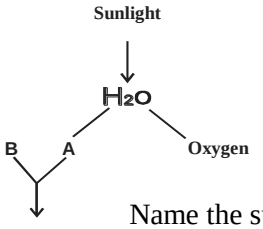
4. a) State two functions of tongue during digestion in the mouth of man. (2 marks)

b) The following experiment was set up to investigate the action of protease on egg white.



After 15 minutes, the contents of the beaker became clear, explain this observation. (2 marks)

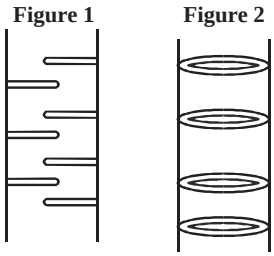
5. The flow diagram below represents photosynthesis process. Study it and answer the questions that follow.



Name the substances: (_ m

6. a) Distinguish between transpiration and guttation. (2 marks)

b) The diagrams below shows two types of patterns of lignification in xylem vessels.



Name the pattern in

Figure 1 ..... (1 mark)

Figure 2 ..... (1 mark)

7. a) List two adaptation of leucocytes to their functions. (2 marks)

b) Differentiate between O+ and O- blood group. (1 mark)

8. a) Explain why it is not possible to drown a locust while holding its head under water. (2 marks) b) State two mechanisms of opening and closing of stomata. (2 marks)

9. In an experiment to measure gaseous exchange between flying locust and its surrounding it was found that for every $1cm^3$ of carbon (IV) oxide, $1.43cm^3$ of oxygen was consumed.

i) Calculate the respiratory quotient forthe food substance that was being oxidised.
(2 marks) ii) State the importance of respiratory quotient.
(2 marks)

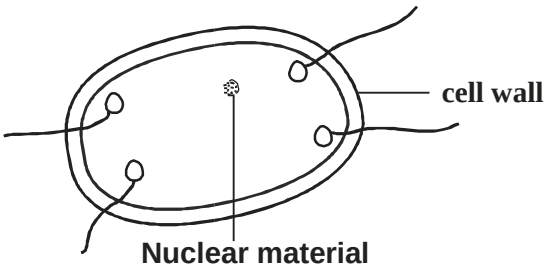
10. Name the main nitrogenous wastes excrete by: (3 marks)
i) Birds
.....
ii) Shark
.....
iii) Cow
.....

11. The table below shows percentage composition of blood plasma and urine from different substances.

Substance	**Blood plasma %**	**Urine %**
Water	90	90
Plasma proteins	8	0
Glucose	0.2	0.1
Urea	0.03	2

a) Explain why;
i) There are no plasma proteins in the urine.
(1 mark) ii) Urea concentration is greater in the urine than in the blood plasma. (1 mark) iii) There is glucose in the urine (1 mark)

12. a) The diagram below represents an organism.



i) Name the kingdom to which the organism belong.
(1 mark) ii) Give a reason for your answer in a (i) above.
(1 mark)

b) Give two reasons why classification is important. (2 marks)

13. A student named cockroach as AMERICAN PERIPLANTA.

a) Identify two mistakes in the name above. (2 marks) b) Write the correct name of cockroach. (1 mark)

14. State **two** density dependent factors that affect population growth in an ecosystem. (2 marks)

15. The following organisms were found in a grassland habitat.

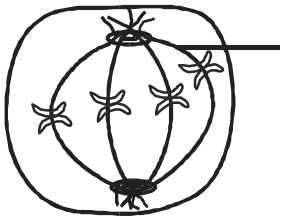
Organism	**Abundance**
Insects	500,000
Snacks	200
Green plants	2,000,000
Mangrove	5

a) Construct a pyramid representing representing the order of feeding in the grassland. (1 mark)

b) Describe two features expected along trophic levels of pyramid constructed. (2 marks)

16. The diagram below shows a cell undergoing a stage in a cell division.

Q



a) Identify the stage..... (1 mark)

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

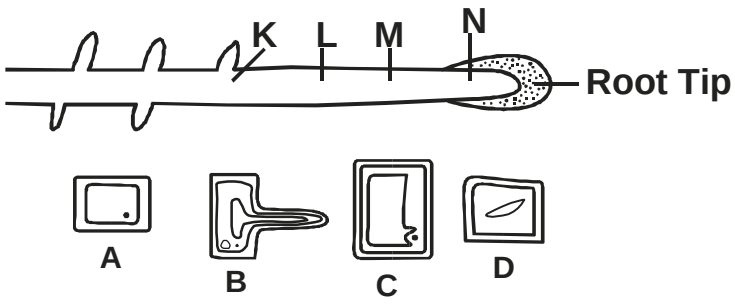
c) What is the functions of the part labelled Q. (1 mark)

17. List two possible effects that are likely to occur if the maternal and foetal circulatory system were directly connected.

(2 marks)

18. State two characteristics of meristematic cells. (2 marks)

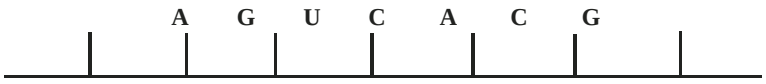
19. The diagram below represents a young root and four cells which occur in different regions of the root tip labelled K, L, M and N.



State the regions of the root tip where each of the cells A B C D occur. (4 marks)

20. State two functions of DNA. (2 marks)

21. Below is a nucleic strand.



a) Name the nucleic acid. (1 mark)
b) Give a reason for your answer in (a) above. (1 mark)
c) Write down the complimentary base pairing the pattern in the nucleic acid formed above. (1 mark)

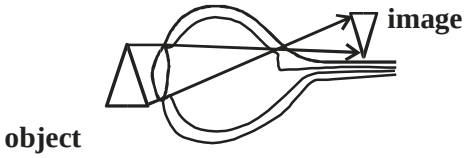
22. State the limitations of fossils as an evidence of evolution. (2 marks)

23. i) The length from tail tip to the anus in a fish is 8cm whereas that from tail tip is 24cm. Calculate the tail power of the fish.

(2 marks)

ii) What is the significance of the high tail power in fish locomotion. (1 mark)

24. The diagram below shows an eye defect.



State the defect. (1 mark)

25. a) Distinguish between exocrine and endocrine glands. (1 mark) b) State the functions of the following parts of mammalian ear:
i) Tympanic membrane (1 mark) ii) Eustachian tube. (1 mark)

26. State the importance of Endoskeleton. (3 marks)

27. Give three types of movable joints found in mammalian skeleton. (3 marks)

GEM SUB-COUNTY JOINT EVALUATION EXAMS

Kenya certificate of secondary education (k.c.s.e)

231/2

BIOLOGY

PAPER 2

TIME: 2 HRS

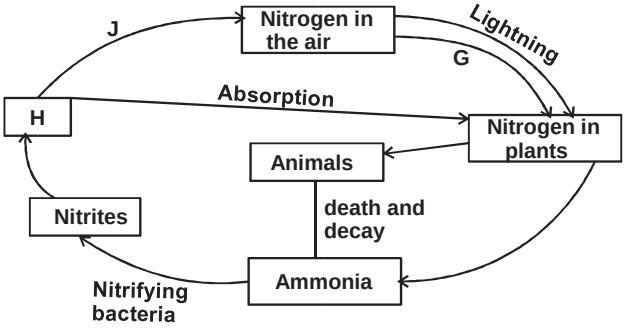
SECTION A (40 MARKS)

Answer ALL questions in this section in the spaces provided.

1. The colour of tips of hair in Shepherd dog is controlled by a gene with three alleles B for Black, R for red and C for copper. A cross between pure breeding red and copper hair tips produce offsprings with scarlet hair tips. Crossing pure breeding red and black hair tips yields all red offsprings. A cross between pure breeds of copper and black produce offsprings that are all copper.

a) Comment on the inheritance of the three alleles B, R and C. (2 marks)
b) A dog breeder wishes to know the genotype of a dog with red hair tips. State and explain the cross needed to determine the dog's genotype. (2 marks)
c) A mother of blood group AB was married to a man of blood group B heterozygous. What is the probability that one of their sons would be blood group A? Show your working. (4 marks)

2. The diagram below represents the nitrogen cycle. Study it and answer the questions that follow.



a) i) Name the processes represented by K. (1 mark)

ii) Identify the organisms responsible for:

Process G..... (1 mark) iii) Process J ..... (1 mark)

iv) Identify the compound represented by H. (1 mark)

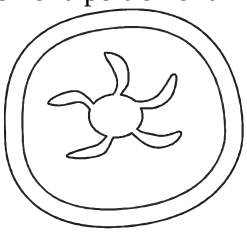
b) Name a method of population estimation in the following:

i) When studying population of fish in a dam. (1 mark)

ii) When studying transition in habits and population through an area. (1 mark)

c) Define eutrophication. (2 marks)

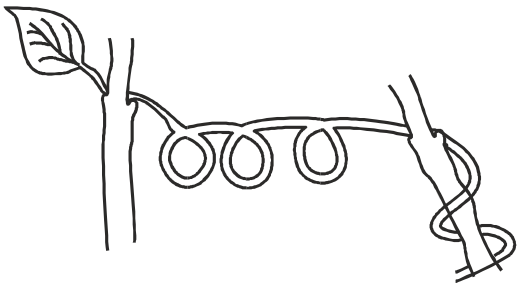
3. The diagram below is a cross section of a portion of alimentary canal.



a) i) Which part of the alimentary canal is represented by the portion above. (1 mark) ii) Give a reason for your answer in (a) (i) above. (1 mark)

b) i) State two functions of the part of alimentary canal represented above. (2 marks)

ii) Explain two structural adaptations of the part of alimentary canal represented above. (4 marks) **4.** A response exhibited by a certain plant tendril is illustrated below.



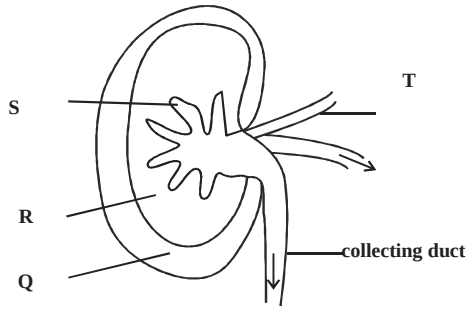
a) Name the type of response..... (1 mark)

b) Explain how the response name in (a) above occurs. (3 marks)

c) Give two significances of the above response to plant. (2 marks)

d) Name two other responses in plants other than the one illustrated. (2 marks)

5. The diagram below is a longitudinal section of an organ in mammals.



a) Name the organ..... (1 mark)
b) Identify the parts R and S. (2 marks)
c) i) State three differences in the structure above found in the desert rat and fish. (3 marks) ii) Account for the differences stated above. (2 marks)
d) Name the gland associated with the secretion of aldosterone hormone. (1 mark)

SECTION B (40 MARKS) Answer question 6 (compulsory) and either question 7 or 8

6. In an experiment, lactic acid concentration was measured before, during and after exercise to determine the effect of exercise on the concentration of lactic acid in blood. Study the data obtained and use it to answer the questions that follow.

Time (minutes)	0	10	20	25	30	40	50	60	70	80	90	100
Lactic acid conc. /obitery units	0.5	0.5	5	13	12	8	6	4	3	2	1	0.9

a) Plot a graph of the concentration of lactic acid against time using a suitable scale. (6 marks) b) From the graph:
i) Determine the period of exercise. ..... (1 mark) ii) Explain (1 mark) c) i) Determine the time when oxygen debt incurred. (1 mark) ii) Explain (1 mark) d) i) The duration it took to pay back the oxygen debt (1 mark) ii) Explain (1 mark)
e) Plot a hypothetical curve for oxygen intake during the experimental period on the same axes. (2 marks)
f) Why does lactic cid level usually continue to rise in the blood after the exercise ceases? (2 marks)
g) State two of effects of lactic acid on tissues. (2 marks)

7. a) Explain how mammalian lungs are adapted for gaseous exchange. (10 marks)
b) Describe the role of the mammalian liver in carbohydrate metabolism. (10 marks)
8.Describe the effects of the various a biotic factors in a terrestrial ecosystem to plants. (20 marks)

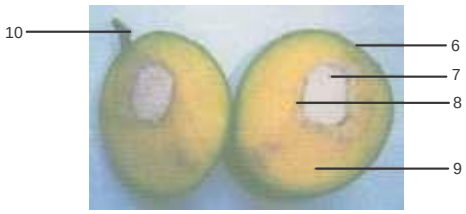
GEM SUB-COUNTY JOINT EVALUATION EXAMS
Kenya certificate of secondary education (k.c.s.e)
231/3
BIOLOGY
Paper 3
(Practical)

1. You are provided with specimens B1, B2 and C. B1 and B2 are similar except that B2 has bee n boiled while B1 and C are fresh.

Cut a small piece of B1 and chop it into small pieces. Place the chopped pieces into a test tube and add 1ml of hydrogen peroxide. Record your observations in the table below. Repeat the above procedure with specimens B2 and C and record your observations in the table.



PHOTOGRAPH Q



PHOTOGRAPH T

PHOTOGRAPH S



PHOTOGRAPH R

Specimen	**Observations**
B1	
B2	
C	

b) Account for your observations involving each specimen. (2 marks)

c) i) Cut another piece of specimen B1 chop it into small pieces, and place into a test tube and add 1ml of hydrogen peroxide. Cover the mouth of the test tube with your thumb for one minute. Introduce a glowing wooden splint into the test-tube. Record your observations and account for them. (2 marks)

Observations

Account for observations

ii) Write down an equation to show the reaction that occurred when hydrogen peroxide was added to B1 in (a) (i) above. (1 mark)

iii) Repeat the procedure in c(i) with distilled water instead of hydrogen peroxide. Record your observations and account for your observations. (2 marks) Observations:

Accounting for observations

d) Explain why it is necessary to cheap the specimens into small pieces before carrying out the experiment. (2 marks)

e) Give a reason why hydrogen peroxide should not accumulate in living tissues. (1 mark)

2. The photographs below show different plants.



A

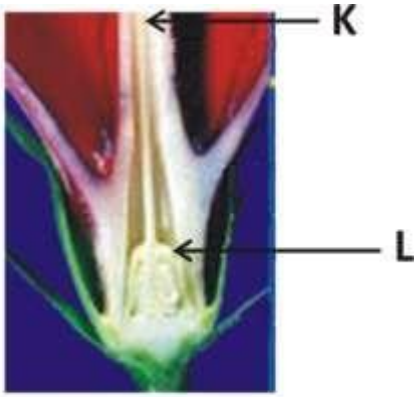


B

a) Name the class of the plants from which the photographs were taken.
b) Name the agent of pollination for the flowers in the photographs above. (1mark)
c) State one observation on the photographs that support your answer in (b) above. (1mark)
d) (i) Identify the type of ovary shown in the photographs below. (2 marks)



X

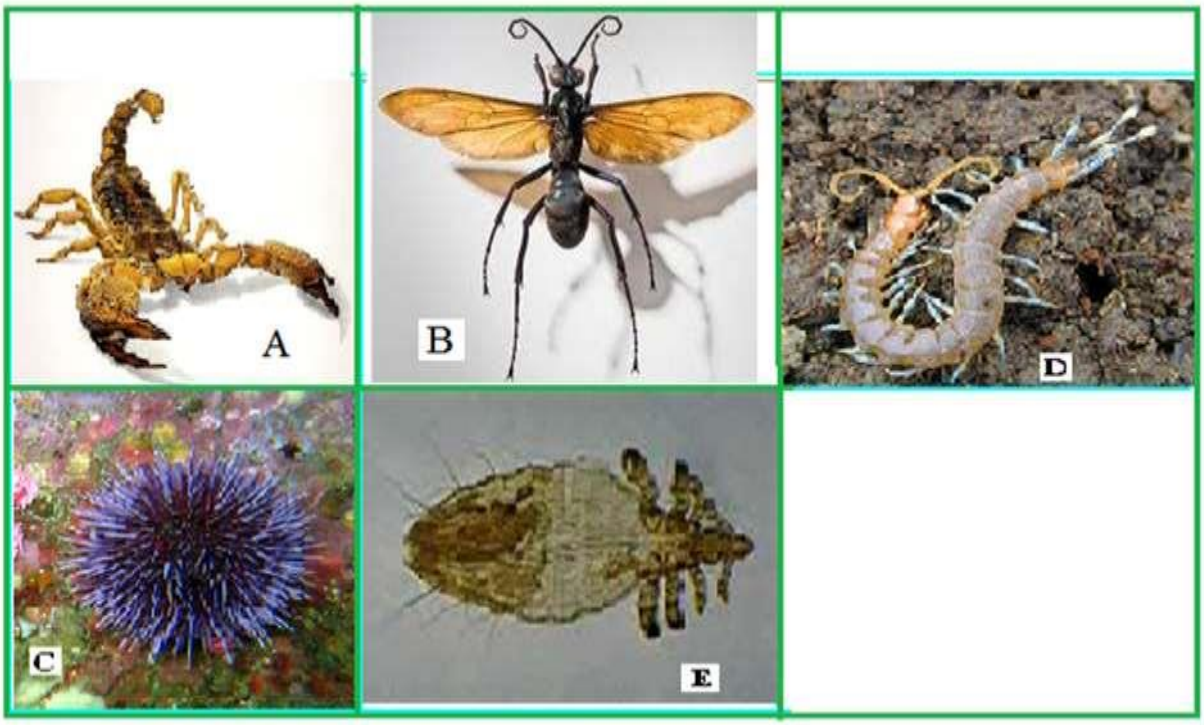


Y

ii) Name the parts labeled **K** and **L** (2 marks)

e) Identify the type of section shown in the photographs X and Y above. (1 mark)

3. Below are drawing of various organisms. Examine them.



i) Name the phylum to which B belongs (1 mark)

ii) Give three reasons for your answer in (a) (i) above (3 marks)

b) Name the class to which specimen A belongs. (1 mark)

c) Give three differences between specimen B and E (3 marks)

Use the dichotomous key provided to identify the organism.

a)	Jointed legs present.....	go to 2
b)	Jointed legs absent.....	go to 7
a)	Have 3 pairs of legs.....	go to 3
b)	Have more than 3 pairs of legs.....	go to 5
a)	With wings.....	go to 4
b)	Without wings.....	Anoplura
a)	Have one pair of wings.....	Diptera
b)	Have two pairs of wings.....	Hymenoptera
a)	Have four pairs of legs.....	Arachnida
b)	Have more than 10 pairs of legs.....	go to 6
a)	With one pair of legs per segment.....	Chilopoda
b)	With two pairs of legs per body segment.....	Diplopoda
a)	With body enclosed in a shell.....	Mollusca
b)	Body surface with spiny projections.....	Echinodermata.

Identify steps followed to identify organism A, B, C, and E (5marks)

Specimen	Steps followed	Identity
A		
B		
D		

E		

'an investment of knowledge pays

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- CS
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