BIOLOGY TOPICAL MOCKS PAPER I,II&III _2020-2022

CHAMPIONS REVISION PUBLISHERS

Service Beyond expectation

TEL: 0725 733 640/0789 733 640 (The marking scheme is available separately)

EMAIL:Cger89@gmail.com

CHAMPIONS K.C.S.E REVISION SERIES EXECUTIVE COORDINATORS/EXAMINERS/BIOLOGY

DISTRICTS FACTORED IN ARE;

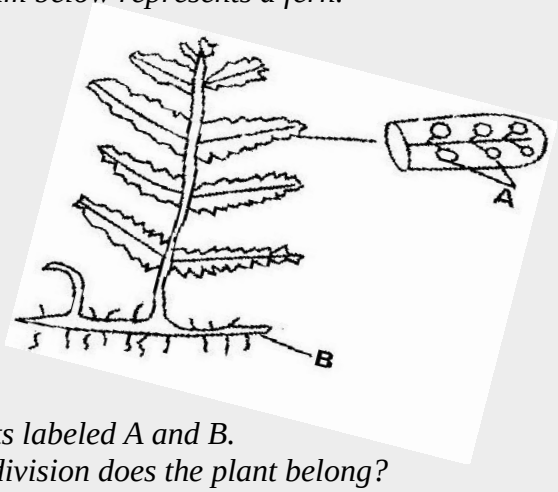
1. *KASSU*
2. *KIKUYU*
3. *DIOCES*
4. *KISUMU WEST*
5. *LAIKIPIA*
6. *LARI*
7. *MANG'U*
8. *MARANDA*
9. *KEMA*
10. *CHAMPIONS*
11. *NAKURU*
12. *NANDI CENTRAL*
13. *CRESCENDO*
14. *KAPSABET*
15. *PANGANI*
16. *SUBUKIA*
17. *SUPA/NASHA*
18. *TRANS –MARA*
19. *WESTLANDS*

SECTION I & II QUESTIONS

1. CLASSIFICATION I &II

1. *Name two classes of phylum arthropoda with cephalothorax.*

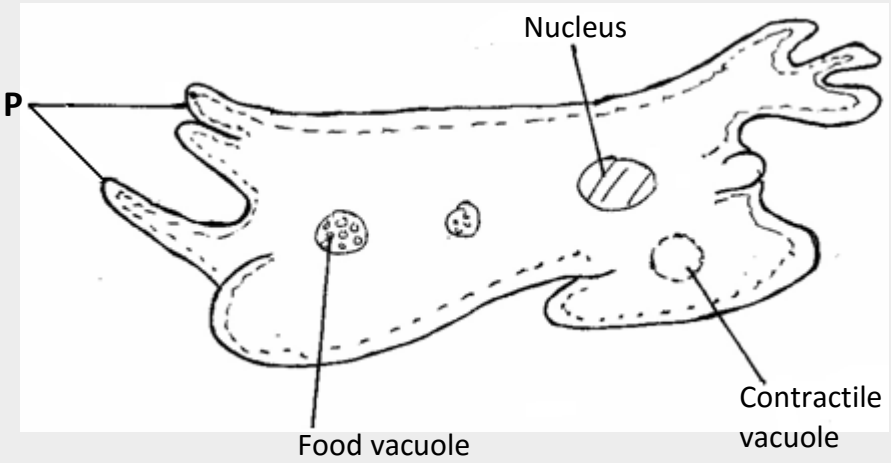
1. *The diagram below represents a fern.*



(a) Name Parts labeled A and B.
(b) To which division does the plant belong?

2. *List any three distinguishing features of class mammalia.*

3. *The diagram below represents a certain organism.*



(a) Identify the kingdom to which the organism belongs.

(b) Identify the part labeled P.

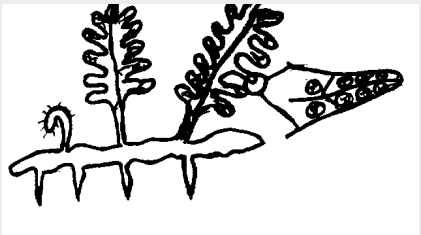
(c) What is the function of contractile vacuole?

4. *Give two characteristics that distinguish scientific names of organisms from the ordinary names*
5. *(a) In which kingdom do bacteria belong?*
(b) Give any two benefits of bacteria to man
6. *(a) State two characteristics that are used to divide the phylum arthropoda into classes.*

(b) Name the class with the largest number of individuals in the phylum arthropoda.

5. *Name the phylum whose members possess notochord*

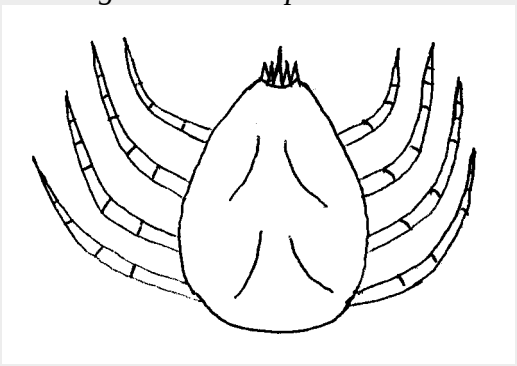
6. *The diagram below represents a plant*



a) Name the division to which the plant belongs.

b) Give three reasons for your answer in (a) above.

6. *The diagram below represents a certain organism*



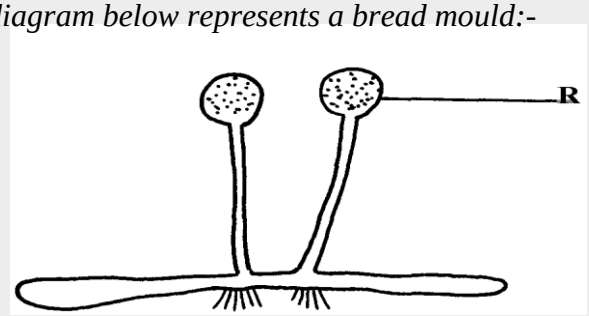
a) Classify the organism into the following taxa;

i) Phylum

ii) Class

b) Name one other organism which belong to the class named in (a) above.

7. *The diagram below represents a bread mould:-*



(a) Identify the kingdom to which the organism belongs:-

7. *Give a reason why no moulting occurs during the adult stages of insects*

8. *Name the branch of Biology that deals with the study of animals*

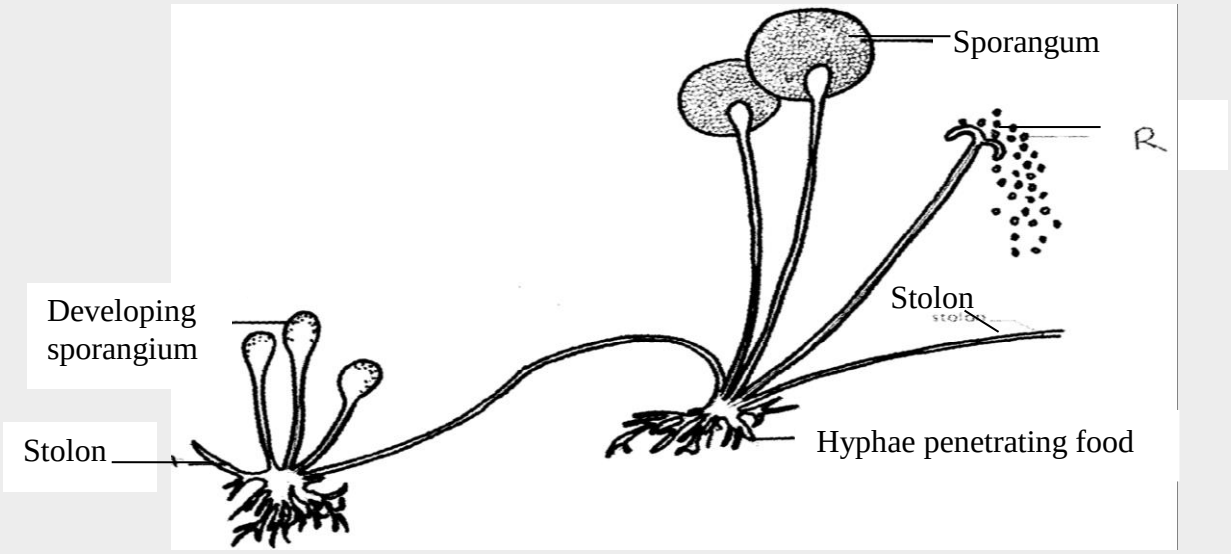
9. *State four ways in which some Fungi are beneficial to human*

10. *During a class practical form four students came across a plant whose flower floral parts were in multiples of fours and fives. To which sub-division and class does the plant belong?*

11. *A student caught an animal which had the following characteristics:-*

- *Body divided into two parts*
- *Simple eyes*
- *Eight legs*
- *The animal belongs to the class*

12. *The diagram below represents a bread mould.*



(a) (i) Name the Kingdom to which bread mould belongs.
(ii) Give two distinguishing characteristics of the Kingdom named in (a)(i) above.
(b) State the function of the part labelled R

12. *The scientific name for a domestic cat is felis Catus. Outline the rule that were never followed in writing the name.*

13(a) *State <u>two</u> characteristics of the Kingdom Monera that are not found in other Kingdoms*

(b) Name the class to which a termite belongs.

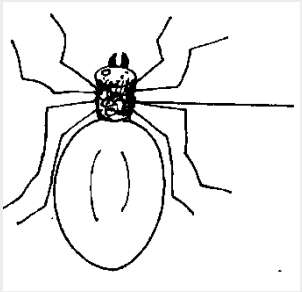
13. *State <u>three</u> differences between members of division Bryophyta and Pteridophyta.*

14. *(a) What is meant by the term taxonomy?*

(b) The scientific name of a rat is Rattus norvegicus

(i) Write the name correctly
(ii) Identify the genus and species names

2. *A student discovered the organism below moving about on the teacher's desk*



(a) Name the class of which the organism belongs.
(b) Name the part labelled B.

14. State two differences between class chilopoda and class diplopoda.

15. List three features that distinguish arthropods from other organisms

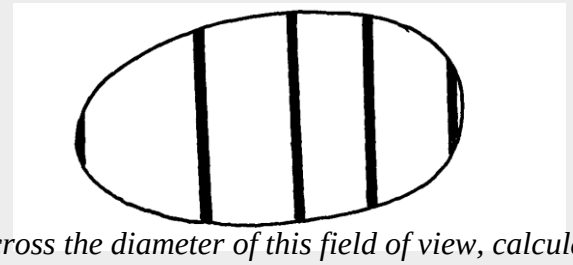
2. THE CELL – STRUCTURE & FUNCTIONS OF ORGANELLES

1. Name the organelles that perform each of the following functions:

a) Digestion and destruction of worn out organelles.
b) Osmoregulation

2. Explain why the following processes are important during the preparation of temporary slides :-
(a) Staining
(b) Use of a sharp cutting blade

3. In a class experiment to establish the size of an onion cell, a leaner observed the following on the microscope field of view.



If the student counted 20 cells across the diameter of this field of view, calculate the size of one cell in micrometers.

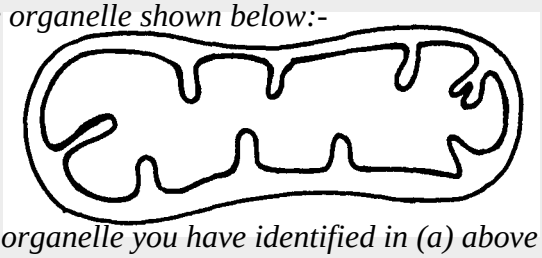
4. State the functions of the following cell organelles: (a) Nucleolus.
(b) Plasma membrane

5. What is the of nucleus of a cell made up of?

6. (a) In a laboratory exercise a student observing a drop of pond water under a microscope saw and drew a spirogyra. If the magnification of the eye-piece was x5 and that of the objective lens was x100, what was the magnification of the spirogyra?

(b) If the spirogyra has a length of 5cm at the above magnification, calculate the actual length in micrometers

7. (a) Identify the organelle shown below:-



(b) How is the organelle you have identified in (a) above suited to its function

8. Identify the structures of the cells that perform the following functions:-

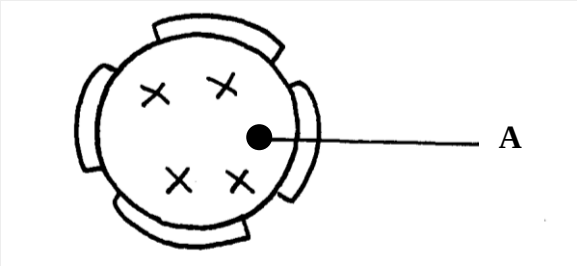
(a) Synthesize ribosomes

(c)Regulate exchange of substances in and out of the nucleus

9. (a) State the roles of enzyme catalase in living cells

(b) Which factor inactivates enzyme?

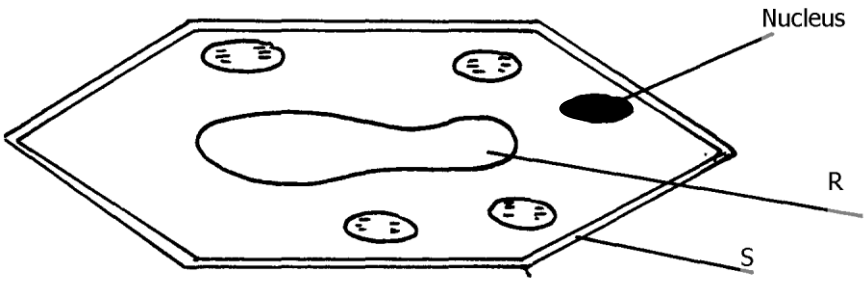
10. *The figure below represents a certain cell organelle:-*



(a) (i) Identify the cell organelle
(ii) What is the function of the part labelled A
(b) Name the organelles that perform each of the following functions;
(i) Osmoregulation in amoeba
(ii) Carries out digestion and destruction of worn out cell organelles

11. *State three properties of the cell membrane*

12. *The diagram below represents a plant cell*



(a) Name a carbohydrate which forms part of the structure labelled S
(b) State two functions of the part labelled R
(c) Name two structures present in the diagram but absent in the animal cell

13. *What do you understand by the following terms*

a) Anatomy
b) Biochemistry

14. *State the function of the following parts of a cell*
a) Ribosome
b) Chloroplasts

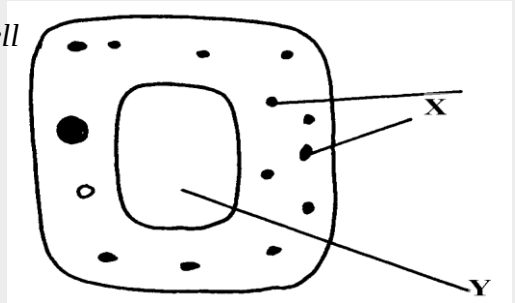
15. *a) What is the formula for calculating linear magnification of a specimen when using a hand lens*

16. *State the function of the following cell structures:- a) Ribosome ;*
b) Centrioles ;

17. *What is the main structural component of:- a) Cell wall*
b) Cell membrane

18. *State two characteristics of the kingdom monera which are prokaryotes*

19. *The diagram below represents a cell*



(a) Name parts labelled X and Y
b) Suggest why the structures labelled X would be more on one side than the other

20. *During a practical class, form fours estimated the field of view to be 3.5mm. Using the low power objective, they observed spirogyra cells across the same field of view and counted 8cells. Calculate the size of each cell and give your answer in micrometer*

21. *A student caught an animal which had the following characteristics:-*

- *Body divided into two parts*
- *Simple eyes*
- *Eight legs*

a) To what class does the animal belong?
b) State two distinctive characteristics of members of the phylum from which the animals in this question (15) belongs

22. *Distinguish between the following terms :-*

a) Magnification and resolution of a microscope
b) Mounting and staining of a specimen

23. *Name the organelle that performs each of the following functions in a cell.*

(a) Transport of packaged glycoproteins
(b) Destruction of worn out cell organelles
(c) Synthesis of proteins

24. *Why are the following procedures done when preparing sections to be observed under a light microscope?*

(a) Making of thin sections
(b) Using a sharp blade to make the sections
(c) Staining

25. *What are the functions of the following parts of a light microscope?*

(a) Eye piece lens
(b) Condenser
(c) Diaphragm

26. *Given that the diameter of the field of view of a light microscope is 2000um. Calculate the size of a cell in mm if 10 cells occupy the diameter of the field of view*

27. *State the importance of the following processes in microscopy:*

(a) staining

(b) sectioning

28. *A cell was found to have the following under a light microscope; cell membrane, irregular in shape, and small vacuoles. Identify the type of the cell above*

29. *State the functions of the following organelles;*

(a) Lysosomes
(b) Golgi apparatus

30. *Name the class in phylum arthropoda which has the largest number of individuals*

31. *State the functions of each of the following parts in a microscope.*

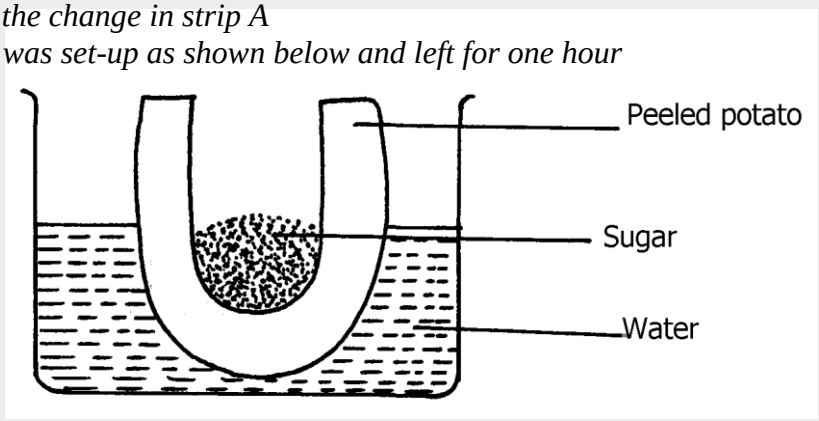
(a) The eye piece lens
(b) The objective lens

32. *The figure below represents an electron micrograph of an organelle that is found in many cells;*

(a) Identify the organelle
(b) State the function of the organelle
(c) What is the importance of infoldings in the inner membrane.
(d) Give two examples of tissues where you would expect many such organelles in animal body.

3. CELL PHYSIOLOGY – OSMOSIS, DIFFUSION AND ACTIVE TRANSPORT

1. *Two equal strips A and B were from a potato whose cell was 30% of sugar. The strip A was placed in a solution of 10% sugar concentration while B was placed in 50% sugar concentration*
   a) What change was expected in strip A and B
   b) Account for the change in strip A
2. *An experiment was set-up as shown below and left for one hour*

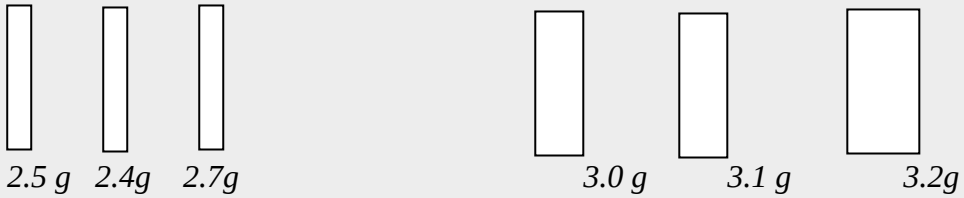


   (a) State the expected result at the end of one hour
   (b) Explain the observations made in this experiment
3. *State what would happen in each of the following:-*

   (a) A plant cell placed in: - *(i) Strong salt solution*
   (ii) Distilled water

4. *State three physiological processes that are involved in movement of substances a cross the cell membrane*

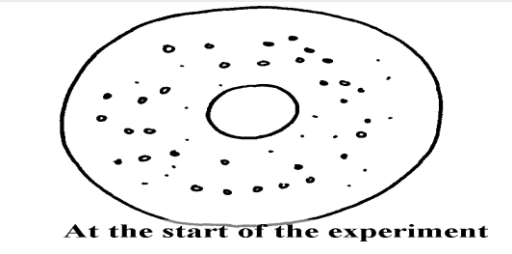
5. *Potato cylinders were weighed and kept in distilled water evernight. They were then reweighed.*



At the beginning of the Experiment. *At the end of the experiment*

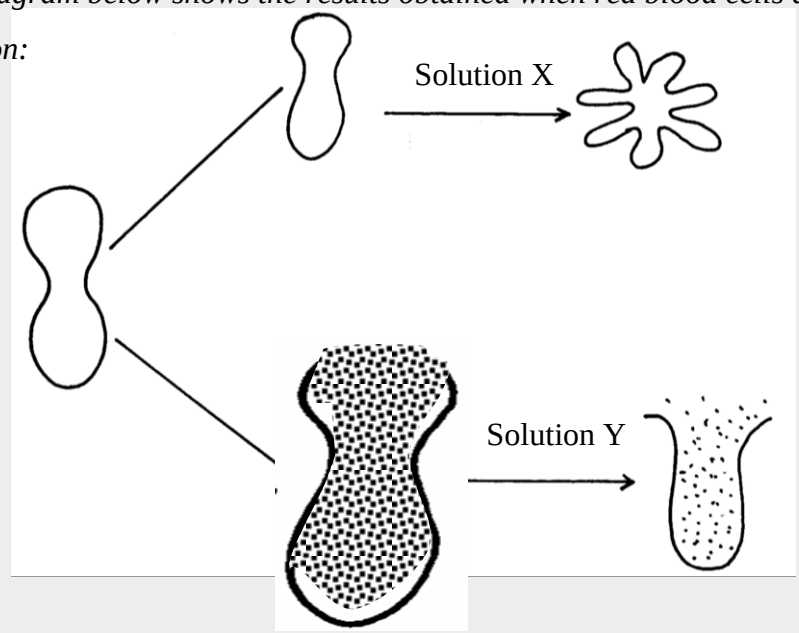
a) Calculate the average mass of a potato cylinders after reweighing. Show your working.
b) Explain why mass of the cylinders hand increased.

6. *The diagrams below show a red blood cell that was subjected to a certain treatment.*



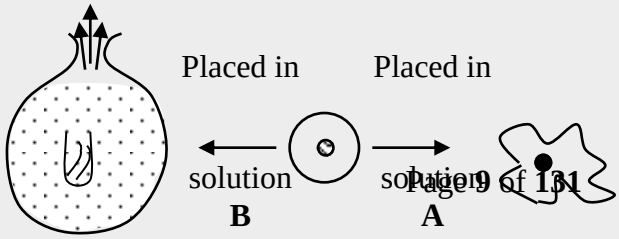
a) Account for the shape of the cell at the end of the experiment.
b) Draw a diagram to illustrate how a plant cell would appear if subjected to the same treatment

7. *The diagram below shows the results obtained when red blood cells are placed in different solution:*



(a) What name is given to the process that occurs when the cell is placed in solution Y?
(b) Describe the process that would occur in a plant cell when placed in a similar solution as that of solution X

8. *The figure below shows the results obtained when red blood cells are put in different solutions:-*

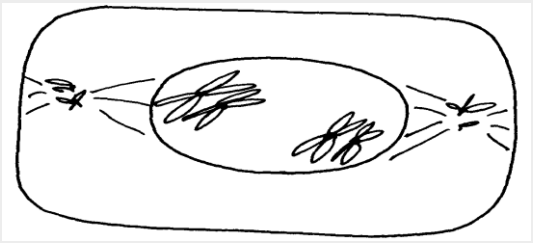


(a) What is the name given to the process that occurs when the cell is put into solution B?
(b) Compare the results obtained when the cell is put in solution B to the results that would be obtained if a plant cell was put in the same solution

9. *Briefly state two adaptation for each of the following cells to their functions*

(i) Spermatozoon
(ii) Palisade mesophlly cell

10. *The diagram below represents a cell at a certain stage in meiotic cell division*



a) Name the stage at which the cell drawn above represents
b) Give a distinguishing reason for your answer in 21(a) above
c) State any two differences between mitosis and meiosis

11. *What are two differences between tropisms and tactic movement*

12. *An experiment was carried out to investigate the effect of different concentrations of sodium chloride on human red blood cells. Equal amounts of blood were added to equal volumes of the salt solution but of different concentrations. The results are shown in the table below:*

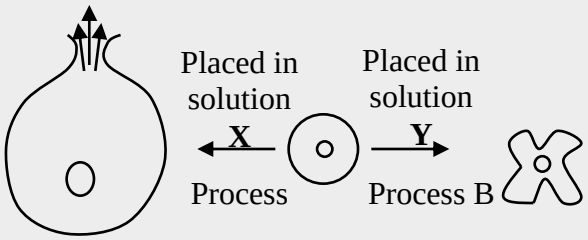
Set -up		*Number of red blood cells*	
	Sodium chloride concentration	*At start of experiment*	*At the end of the experiment*
A	*0.9%*	*Normal*	*No change in number*
B	*0.3%*	*Normal*	*Fewer in number*

(a) Account for the results in the set-up
(b) If the experiment was repeated using 1.4% sodium chloride solution, state the expected results with reference to:
(i) the number of red blood cells
(ii) the appearance of red blood cells if viewed under the microscope

13. *Name support tissues in plants characterized by the following*

(i) Cells being turgid
(ii) Cells being thickened by cellulose
(iii) Cells being thickened by lignin

14. *The diagram below illustrates the behaviour of red blood cells when placed into two different solutions X and Y.*



(a) Suggest the nature of solutions X and Y.
(b) Name the process A and B.
(c) What would happen to normal blood cell if it were placed in a solution isotonic.

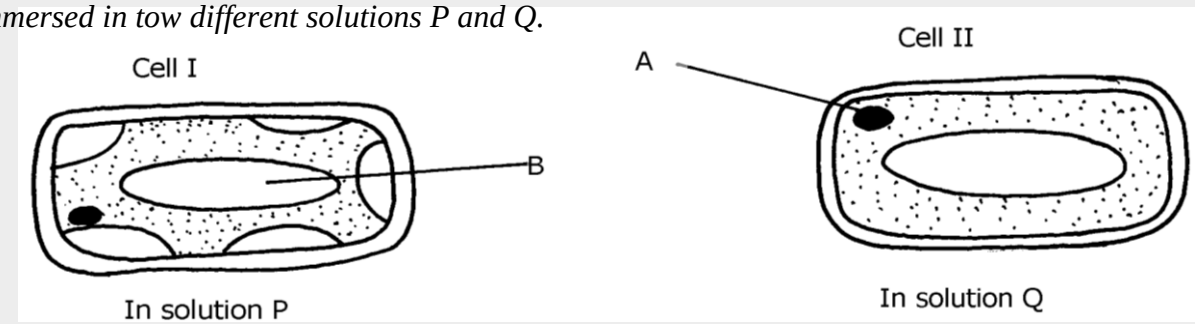
15. *Name two plant processes in which diffusion plays an important role*

16. *Two fresh potato cylinders of equal length were placed one in distilled water and the other in concentrated sucrose solution:*

(a) Account for the change in length of the cylinder in:

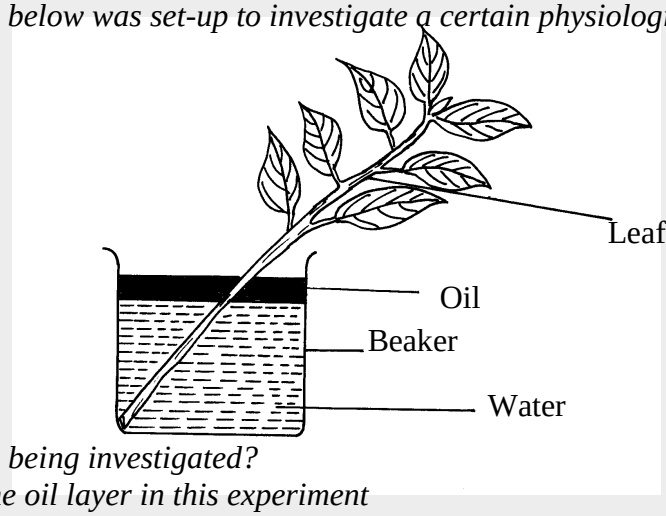
(i) Distilled water
(ii) Sucrose solution
(b) (i) What would be the result in terms of length if a boiled potato was used?
(ii) Explain your answer in(b)(i) Above
(c) State two uses of the physiological process being demonstrated in the experiment

17. *The two cells shown below are obtained from two different potato cylinders which were immersed in tow different solutions P and Q.*



a) i) Name the structure labelled A.
ii) State the function of structure B.
b) If eight of cell I were observed across the diameter of the filed of view of 0.5 mm.
Work out the actual diameters of each cell in micrometers.
c) Suggest the identity of the solution Q.
d) Account for the change in cell I above.
e) State any one importance of the physiological process being demonstrated above in animals.

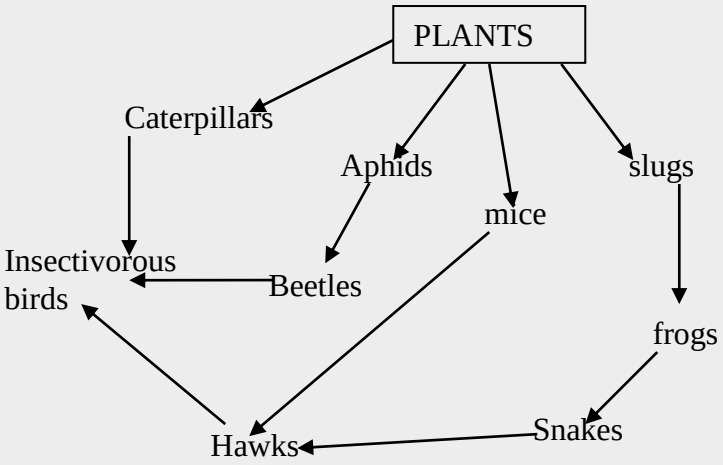
18. *An experiment shown below was set-up to investigate a certain physiological process in plants:-*



(a) What process was being investigated?
(b) Give the role of the oil layer in this experiment
(c) (i) What observation did the students make after leaving the set-up in bright sunlight for two hours?
(ii) Explain the observation in (c)(i) above
(d) What effect will the following have on the observation made?:-
(i) Fanning the shoot

(ii) Removing all the leaves from the shoot
(iii) Placing the set-up in the dark
(e) Suggest a suitable control for this experiment

19. *Study the following food web and answer questions that follow:*



(a) (i) Name the organisms that occupy the second trophic level
(ii) What is the other name for the second trophic level
(b) Write down two food chains from the food web that:
(i) End with hawks as tertiary consumer
(ii) End with hawks as quaternary consumer
(c) Giving reasons state;
(i) the organism with largest biomass
(ii) the organism with least biomass

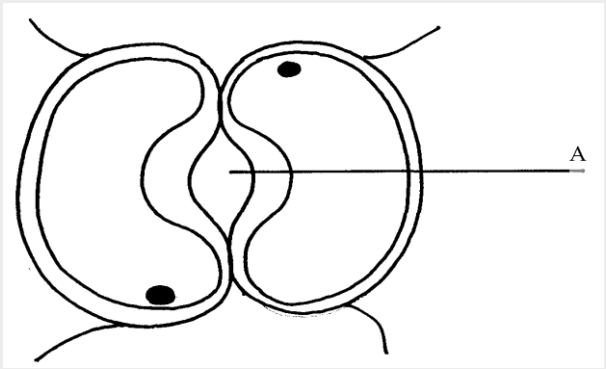
4. NUTRITION IN (A) PLANTS (B) ANIMALS

1. *The chemical equation below represents a physiological process that takes place in living organisms:*

$$C_6H_{12}O_6 + C_6H_{12}O_6 \xrightarrow{R} C_{12}H_{22}O_{11} + Q$$

(a) Name the process R
(b) Name the substance Q

2. *The diagram below shows cells in plants:-*



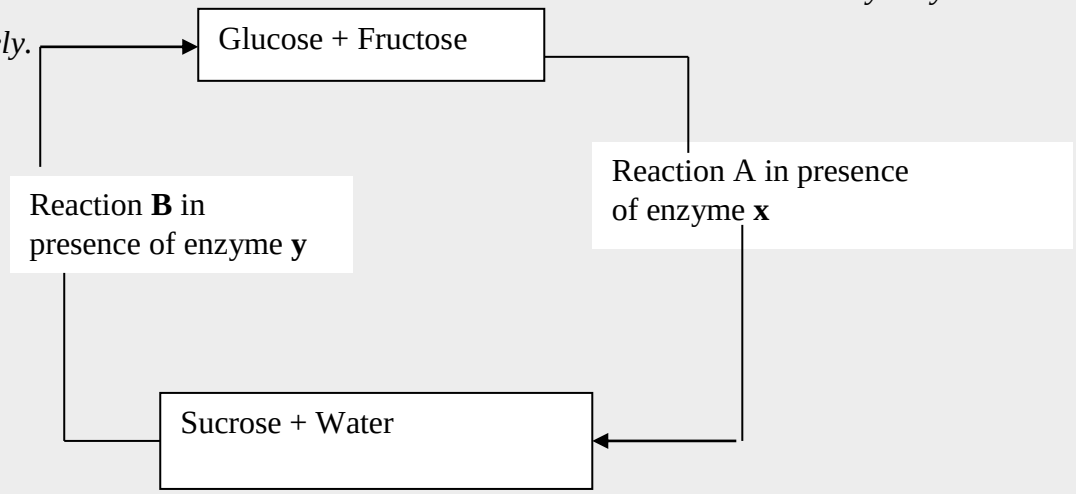
(a) Identify the cells shown above
(b) Explain how the cells are adapted to their function
(c) Explain how accumulation of carbon (IV) Oxide in the cells above would lead to the closure of structure A

3. *(a) A leaf of a potted plant kept in darkness for 48hours was smeared with Vaseline jelly then exposed to sunlight for 8hours. Explain why the test for starch in the leaf was negative*
(b) Name two other processes that were interfered with in the plant

4. *List two functional differences between plants and animals.*

5. *Explain how the guard cells are adapted to perform their function.*

6. *The diagram below shows chemical reactions A and B which are controlled by enzymes x and y respectively.*



(a) Name: (i) Reaction A.
(ii) Enzyme y

7. *What are the two functions of bile salts during the process of digestion?*

8. *State three adaptations of aquatic plants to photosynthesis*

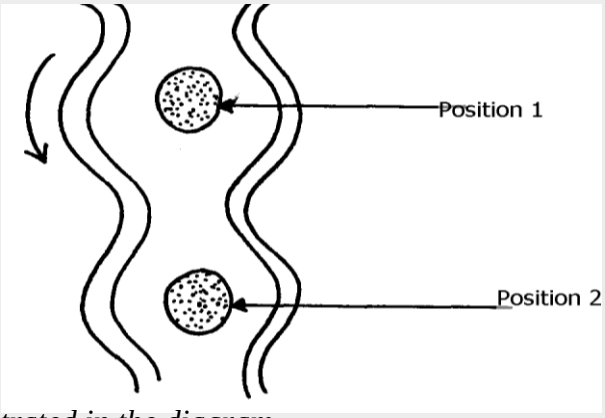
9. *A biological washing detergent contains enzymes which remove stains like mucus and oils from clothes which are soaked in water with the detergent:-*

(a) Name two groups of enzymes that are present in detergent
(b) Explain why stains would be removed faster with the detergent in water at 35^{o}C rather than at 15^{o}C

10. *Name the diseases caused by deficiency of : (a) Iodine*
(b) Vitamin C

11. *Name two enzymes and one metal ion that are needed in the blood clotting process*

12. *The diagram below shows how food boles move along the human oesophogus and the Intestine*



(a) Identify the process illustrated in the diagram

(b) Briefly state how the movement of food boles from position 1 to position 2 is achieved
(c) Name one component of a persons diet that assists in the movement of food described in (b) above

13. *State two adaptations of herbivores which enable them to digest cellulose*

14. *State two factors that affect the rate of osmosis*

15. *A certain organ K was surgically removed from a rat, later drastic increase in glucose level in the blood was reported but when substance Q was injected into the animal the whole process was*

reversed.

Identify: *(i) Organ K*

(ii) Substance Q

16. *a) Name the component of a persons diet that is essential for peristalisis*
b) Give two groups of food which are reabsorbed along the mammalion digestive system without undergoing digestion

17. *State three roles of light in photosynthesis*

18. *State two ways in which the guard cells differ their adjacent epidermal cells*

19. *One of the components of bile is a chemical left over from destruction of red blood cells*

i) Identify the chemical substance
ii) What is the role of bile in digestion

20. *(a) What is peristalsis?*
(b) Explain how the process above is brought about.

21. *The following reaction may occur in a forward and backward direction.*

Water + Carbon (IV) Oxide $\rightleftharpoons$ *Glucose + Oxygen + Energy*

(a) Name the organelle where the reaction occurs in:

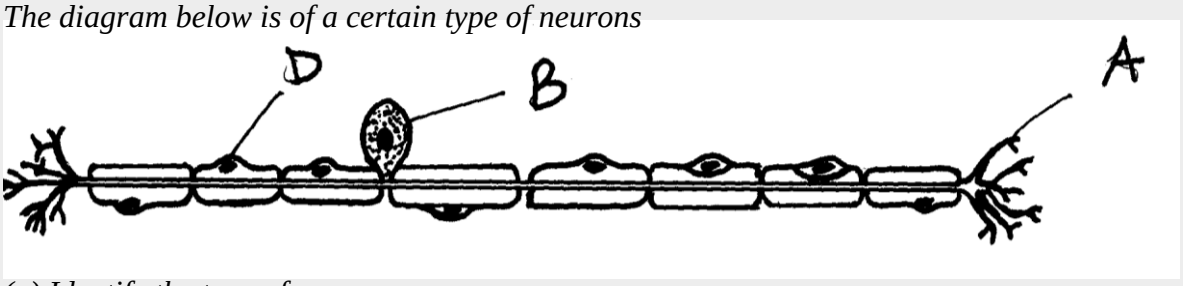
(i) Forward direction
(ii) Backward direction

(b) Give one difference and one similarity for the two organelles named in (a) above

22. *A solution of sugar cane was boiled with hydrochloric acid and sodium hydrogen carbonate was added to the solution, which was then boiled with benedicts solution. An orange precipitate was formed.*

(a) Why was the solution boiled with hydrochloric acid and then sodium hydrogen carbonate added in it
(b) To which class of carbohydrates does sugar cane belong?
(c) State the form in which carbohydrates are:
(i) Transported in animals
(ii) Transported in plants

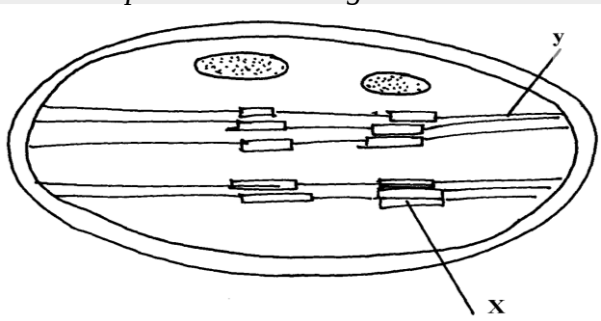
23. *The diagram below is of a certain type of neurons*



(a) Identify the type of neuron
(b) Give a reason for your answer in (a) above
(c) Give the functions of the parts labeled A, B, and D

24. *a) The mitochondria organelle has cristae structure on the inner membrane. State the function of the cristae*

b) The diagram below represents a cell organelle



i) Name the part labeled Y

ii) State the function of the part labeled X

25. *a) State the role of emulsification in the digestion of fats in the alimentary canal*

b) What is the function of hydrochloric acid in the alimentary canal

26. *Briefly explain the effect of poisoning the roots hair on the uptake of nitrate by plants*

27. *Briefly explain the symbiotic relationship in the root nodule of a leguminous plant*

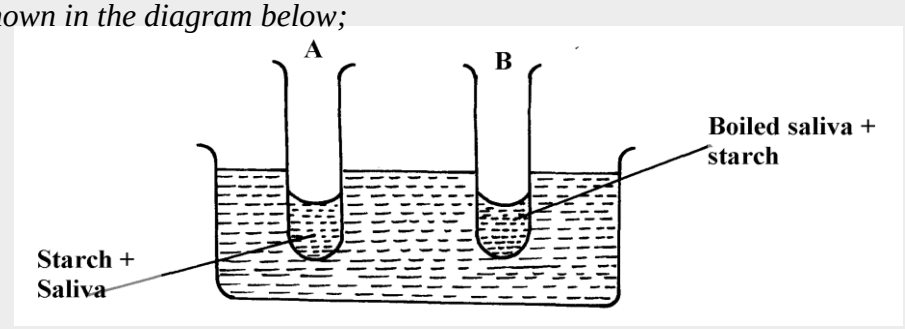
28. *Explain how saliva is important in digestion*

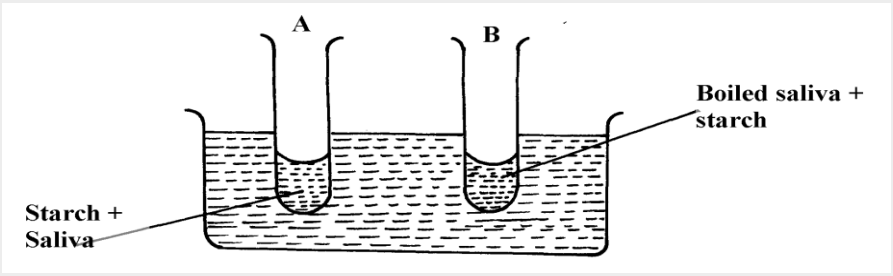
29. *What is the fate of excess glucose in plants?*

30. *State two ways in which guard cells differ from other epidermal cells*

31. *Briefly explain the fate of the following products from the light stage of the process of Photosynthesis:*
    (a) Oxygen
    (b) Hydrogen
    (c) ATP

32. *In an experiment to investigate on aspect of digestion, two test tubes A and B were set-up as shown in the diagram below;*

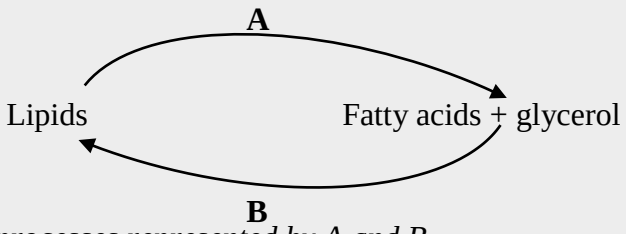




The test tubes were left in the bath for 30minutes.The content of each test tube was then tested for starch using iodine solution:-

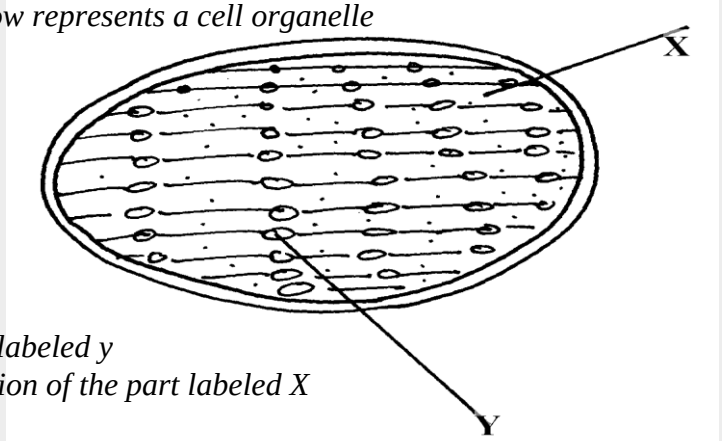
(a) What was the aim of the experiment?
(b) What results were expected in test-tube A and B
(c) Account of the results you have given in (b) above in test tube A and B

33. *Below is a process that takes place along the mammalian digestive system:*



(a) Name the processes represented by A and B
(b) Name part of the alimentary canal where the process B takes place

34. *The diagram below represents a cell organelle*



(i) Name the part labeled y
(ii) State the function of the part labeled X

(ii) State the function of the vitamin named in (i) above

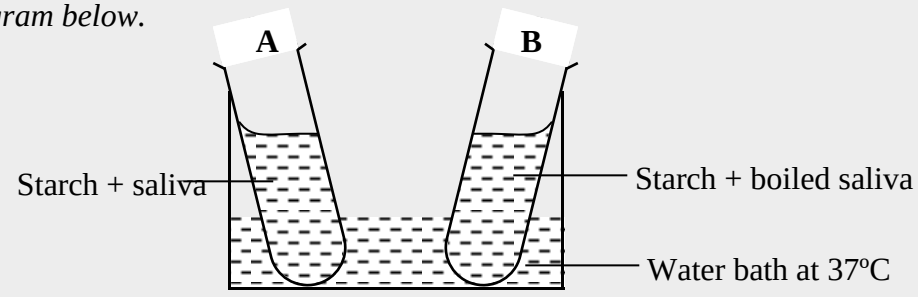
36. *(a) Name the disease caused by schistosoma parasites in man.*
(b) How is schistosome adapted to its parasitic mode of life?

37. *The table below shows three enzymes A, B and C and their respective optimum pH.*

Enzyme	*Optimum pH*
A	*6.8*
B	*2.0*
C	*8.0*

(a) (i) Name the most likely region of the alimentary canal of a mammal where enzyme B would be found.
(ii) Give a reason for your answer in (a) (i) above

38. *In an experiment to investigate an aspect of digestion, two tubes A and B were set up as shown in the diagram below.*



The test tubes were left in the water bath for 30 minutes. The content of each tube was then tested for starch using iodine solution.

(a) What was the aim of the experiment?

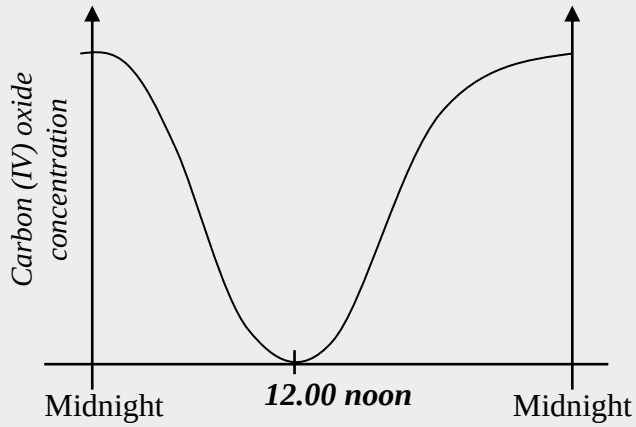
(b) Explain the expected in the tube.

39. *(a) Name the specific part of the chloroplast where the following processes occur.*

(i) Carbon IV oxide fixation
(ii) Photolysis

(b) State one way in which the dark reactions of photosynthesis depends on light reaction.

40. *The concentration of carbon IV oxide in a tropical forest was measured during the course of 24 hour period from mid-night. The graph below shows the results obtained.*



Account for the results obtained at: (i) Midnight.
(ii) At 12.00 noon.

41. *State three ways by which the rate of enzyme controlled reactions can be increased.*

42. *Study the dental formula given below:*

$$I\ \frac{0}{4};\ C\ \frac{0}{0};\ PM\ \frac{3}{3};\ M\ \frac{2}{3}$$

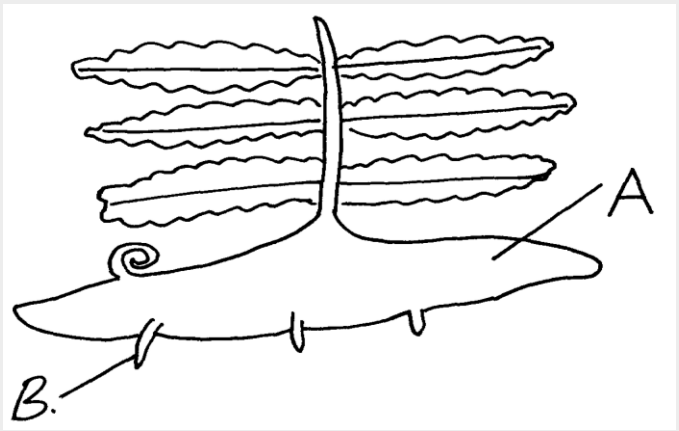
(a) Identify with reasons the mode of feeding of the animals whose dental formula is given above

(b) Calculate the total number of teeth in the mouth of the above animal

43. *Explain why small mammals such as moles feed more frequently than larger ones such as elephants*

44. *State three ways by which plants compensate for lack of the ability to move from one place to another*

45. *Study the diagram below and answer the questions that follow*



(a) Label the parts A and B
(b) State one observable difference between the structure above and the liverwort

46. *What is glycolysis?*

47. *(a) State two difference between monosaccharide and polysaccharides*

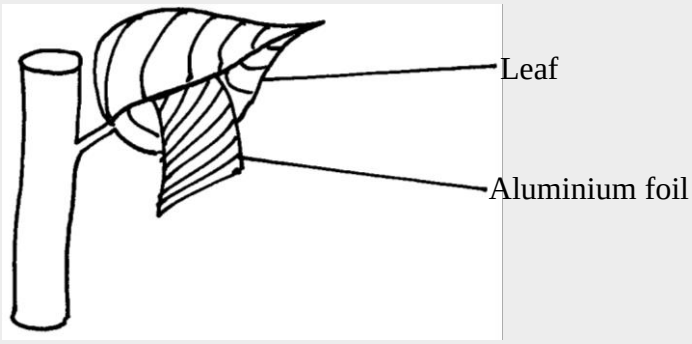
(b) Name the bond found in proteins

48. *Name two products of light reaction used in the dark reaction*

49. *State two functions of the large intestine in humans.*

50. *The diagram below shows a leaf of a growing plant partly covered with aluminium foil.*

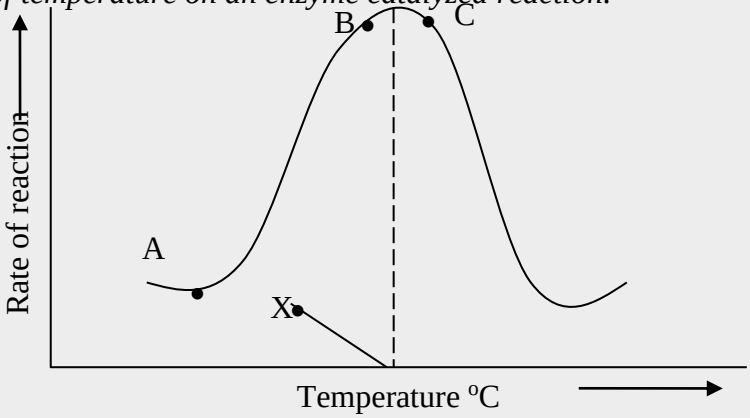
The plant was placed in the sun from morning to midday and then tested for starch.



(a) What was the aim of the experiment?

(b) State the observation made when the leaf was tested for starch

51. *The figure shows the effect of temperature on an enzyme catalyzed reaction.*

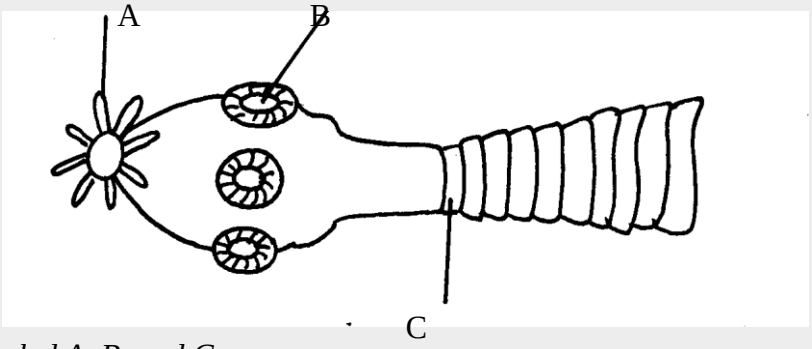


(a) Explain what happens between A and B

(b) What is X?

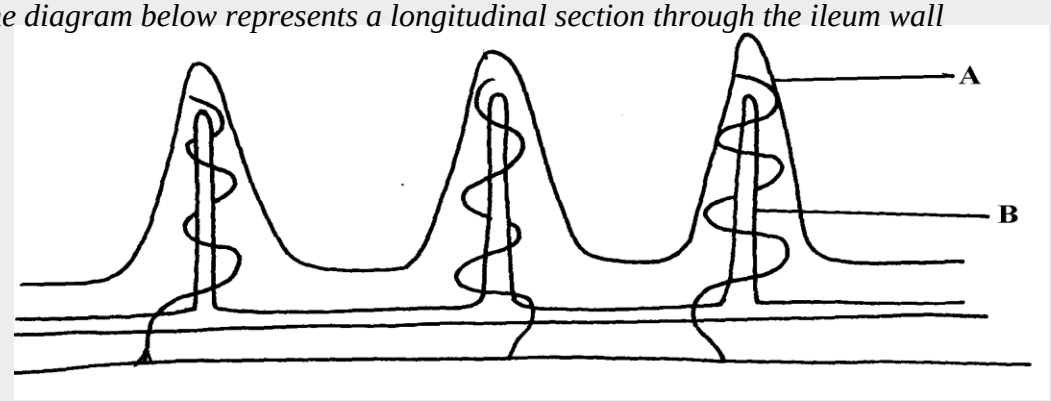
52. *Name two mineral elements that are necessary in the synthesis of chlorophyll.*

53. *The figure below is a diagram of the anterior portion of the tapeworm. Taenia solium.*



(a) Name the parts labeled A, B, and C
(b) What is the intermediate host of Taenia Solium?

54. *The diagram below represents a longitudinal section through the ileum wall*



a) Identify the structure labeled A and B

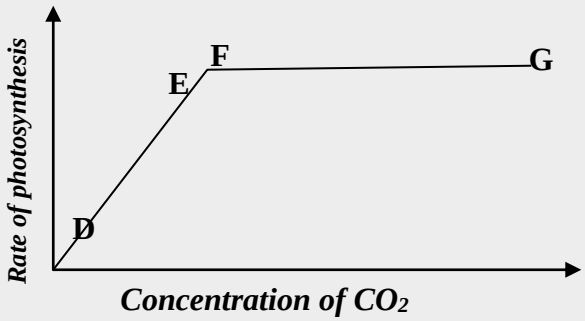
b) State one function of A and B

c) State two functions of the ileum

d) Explain the role of the liver in digestion

e) State the endocrine role of the pancreas in a mammal

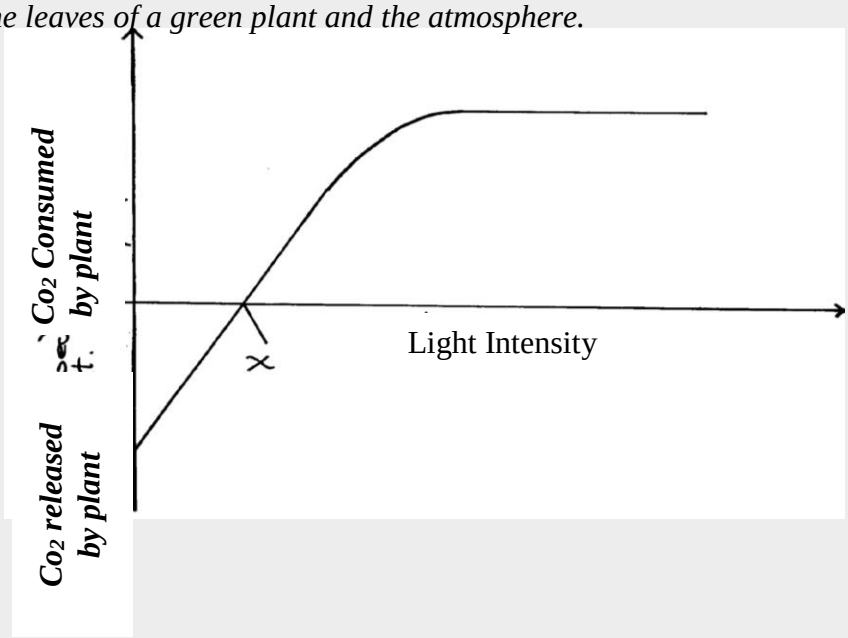
55. *The chart below shows the relationship between concentration of CO_2 around the plant and the rate of photosynthesis*



(a) Account for the rate of photosynthesis between D-E
(b) Account for the rate of photosynthesis between F-G

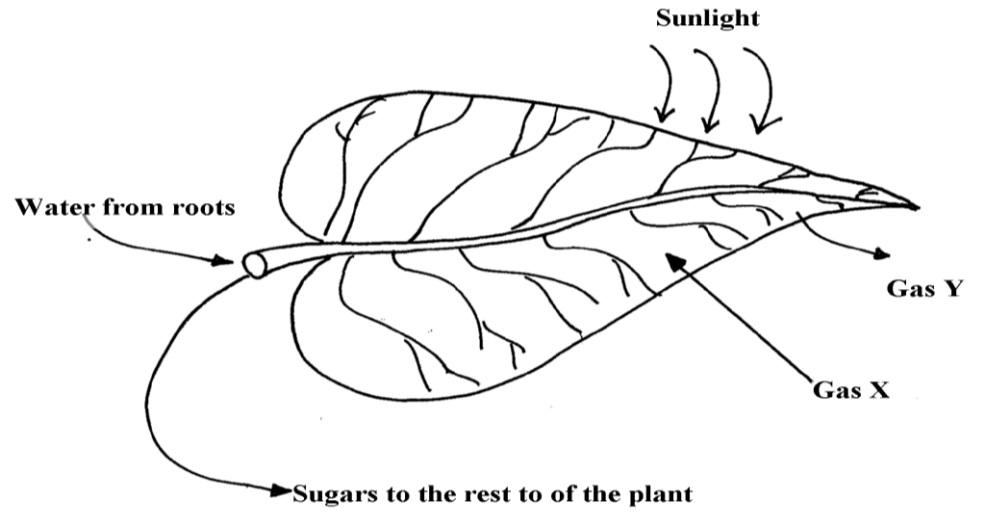
(c) Briefly describe the reactions during the light stage of photosynthesis

56. *The diagram below shows the effect of varying light intensity on the exchange of carbon IV oxide between the leaves of a green plant and the atmosphere.*



a) What is the name given to the point marked x?
b) i) With reference to carbon IV oxide exchange state what happens at point x.
ii) Explain how the effect observed at point x occurs.
c) Explain why there is a net uptake of carbon IV oxide at light intensity above x.
d) What would happen to the plant if light intensity falling on it were maintained at x throughout?
e) What can you say about the exchange of oxygen between the plant and the surrounding air at intensities below x?

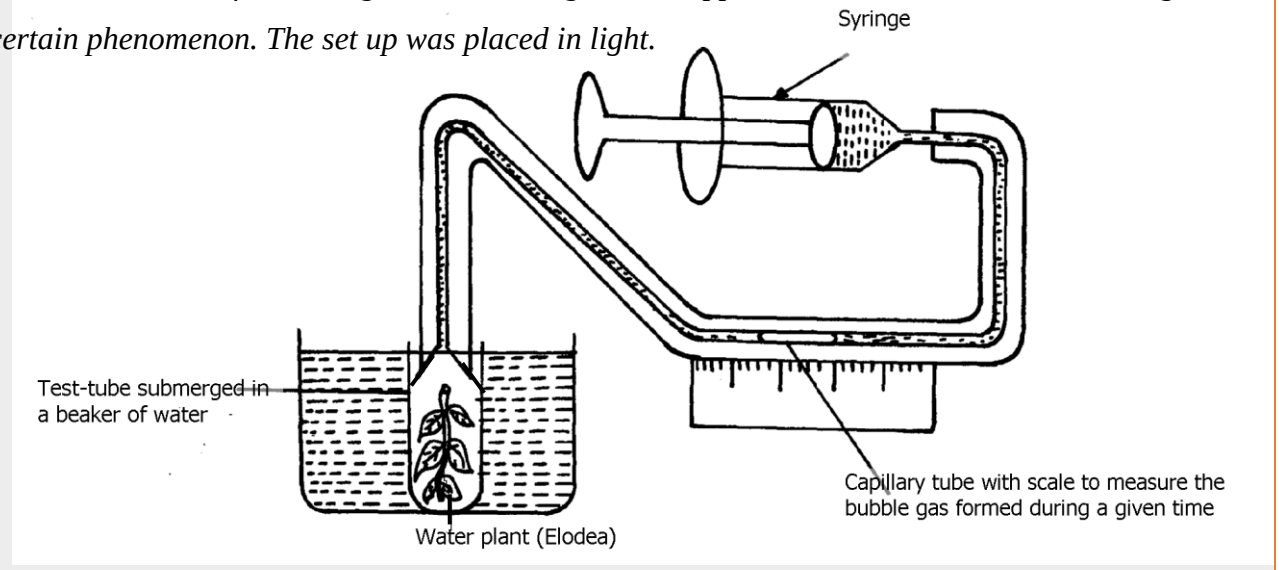
57. *The following diagram of a leaf shows what happens in a pant leaf during photosynthesis:-*



(a) Give two ways in which leaves are adapted to absorb light
(b) Name the gases labelled X and Y
(c) Name the tissue that transports water into the leaf and sugars out of the leaf
(d) Explain why it's an advantage for the plant to store carbohydrates as starch rather than as sugars

58. *(a) What is meant by digestion?*
(b) Describe how mammalian small intestine is adapted to its function

59. *Form one students from Inungo school arranged their apparatus as shown below, to investigate a certain phenomenon. The set up was placed in light.*



(a) State the likely aim of the set up
(b) State the role of the syringe in the set-up above
. *(c) (i) Name gas X*
(ii) Write an equation to show how gas X was formed in the set-up
(d) State three factors that increase the rate of enzyme activity
(e) Give a reason why the test tube is immersed in a beaker of water

60. *A student was culturing E. coli (a bacterium) in a Petri-dish. He placed the Petri-dish in an incubator at 30^{o}C.He removed it from the incubator the following day and found that five colonies of bacteria had grown. He decided to return it into the incubator to give it more time. When he removed it fourteen days later, he could not observe any colony.*

a) Why was there no colony on the fourteenth day?
b) Explain how bacteria cause spoilage of stored food in warm moist conditions.
c) Name other organisms which also cause food spoilage.
d) State their economic importance to nature.

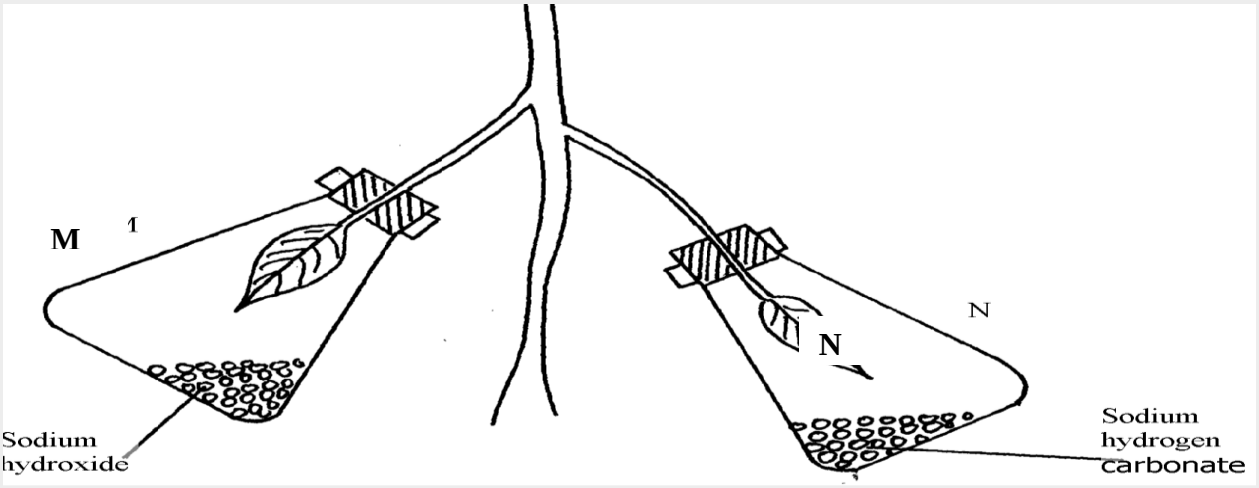
61. *The table below shows the results of an experiment carried out to determine the rate of photosynthesis at different light intensities and varying Carbon (IV) oxide concentrations. The rate was determined by counting the number of bubbles per minute. The temperature was kept constant*

Light intensity in lux	*% carbon(IV)oxide concentration*						
	0.0%	*0.3%*	*0.6%*	*0.9%*	*1.2%*	*1.5%*	*1.8%*
1500	*0*	*16*	*30*	*38*	*40*	*40*	*40*
6000	*0*	*52*	*80*	*96*	*100*	*98*	*100*
10000	*0*	*80*	*100*	*115*	*120*	*122*	*120*

a) On a graph paper provided, draw a graph for each of the light intensities. All the three graphs should be plotted on the same axis (rate of photosynthesis on vertical axis and carbon (IV) oxide concentration on horizontal axis
b) What is the effect of an increase in carbon (IV) oxide concentrations and light intensities
c) Briefly explain how aquatic green plants meet light intensities and carbon (IV) oxide requirement
d) Using the data provided in the table state two factors required by the green plants for food production

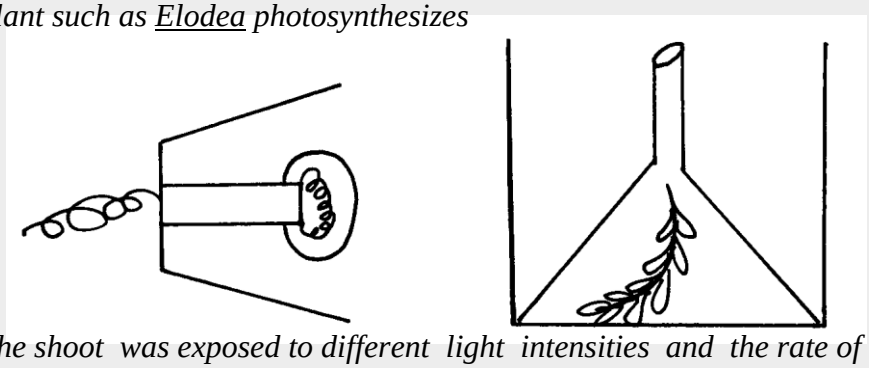
62. *Explain how the mammalian intestines are adapted to perform their function.*

63. *A healthy plant was kept in the dark for 24hours following which two of its leaves were enclosed in glass flasks as shown below. The set up was the exposed to sunlight for a number of hours.*



(a) Why was it necessary to keep the plant in the dark for 24 hours?
(b) Give the function of each of the following in the experiment
(i) Sodium hydroxide
(ii) Sodium hydrogen corbonate
(c) Explain the expected results in leaf.
(i) M when tested for starch
(ii) N when tested for starch?
(d) Suggest a suitable control for this experiment

64. *The diagram below shows an experiment that was carried out to measure how fast a were plant such as <u>Elodea</u> photosynthesizes*



The shoot was exposed to different light intensities and the rate of photosynthesis estimated by counting the number of bubbles of gas leaving the shoot in a given time. the results are given below;

Number of bubbles per minute	*7*	*14*	*20*	*24*	*26*	*27*	*27*	*27*
Light intensity (Arbitrary units)	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*

a) Plot these data on apiece of graph paper provided

b) At what light intensity did the shoot produce ;
i) 18 bubbles per minute
ii) 25 bubbles per minute
c) Give two better ways of measuring the rate of photosynthesis than counting bubbles
d) What is the role of light intensity in photosynthesis
e) Account for the expected results of doing this experience at the following temperature;
i) 4ºC
ii) 34ºC

iii) 60°C

f) Other than light intensity and temperature, name other factors that affect the rate of photosynthesis

65. *In an experiment, a leaf from a plant which had been kept in the dark overnight was boiled in water for a minute. It was then boiled in alcohol and washed in warm water. Iodine solution was then added onto the leaf:*

(a) Why was the loaf boiled in;- *(i) Water*
(ii) alcohol

(b) (i) What observation was made on the leaf after adding iodine solution
(ii) Give a reason for your answer in (b) above

(c) What was the aim of the experiment

(d) Why was it necessary to wash the leaf in warm water

(e) What is a variegated leaf?

(f) Write a word equation for the process of photosynthesis

5. TRANSPORT IN (A) PLANTS (B) ANIMALS

1. *Explain why a fresh wound on the skin bleeds more on a hot sunny day than on a cold chilly day*

2. *State three adaptations of red blood cells to their functions.*

3. *How are sieve tube elements adapted to their function*

4. *Name the polysaccharides found in the following structures:-* *(a) Exoskeleton*
(b) Xylem vessels

5. *State three factors that maintain transpiration stream*

6. *(a) List three forces that facilitate the transport of water and mineral salts up the stem.*
(b) Name the tissue that is removed when the bark of a dicotyledonous plant is ringed.

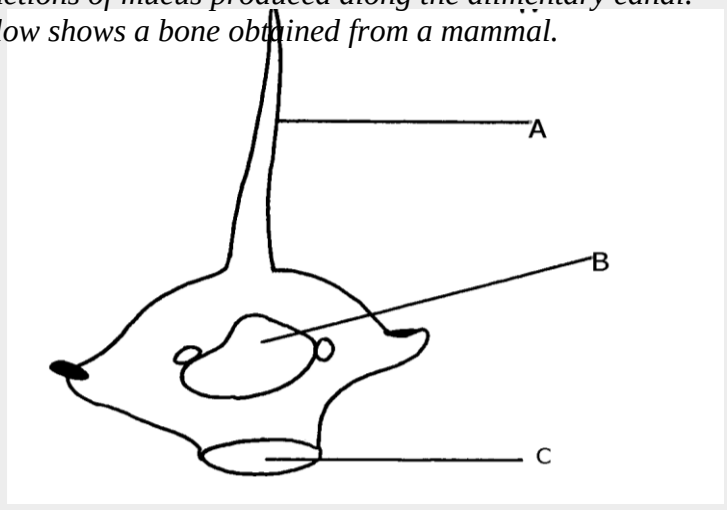
7. *Study the dental formula of an organism below..*

$I\,^{3}/_{3},\quad C\,^{1}/_{1},\quad Pm\,^{3}/_{2},\quad M\,^{1}/_{1} = x$

(a) (i) What is the total number of teeth this organism possess?
(ii) What is the mode of feeding of the organism?

(b) State two functions of mucus produced along the alimentary canal.

8. *The diagram below shows a bone obtained from a mammal.*



(a) Name the part of the skeleton from which the bone has been taken.

(b) Label the parts B and C.

(c) State the functions of part A.

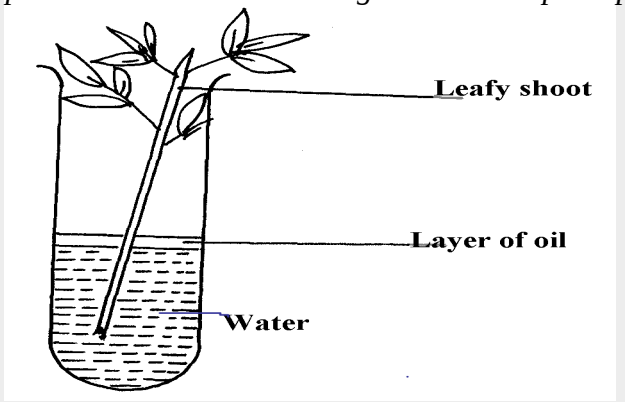
9. *What is the destination of materials translocated in plants.*

10. *A person whose blood group is AB requires a blood transfusion, name the blood groups of the*

donors.

11. *Explain why capillaries are:* *(i) Thin walled*
(ii) Branched

12. *An experiment was set-up as shown below to investigate a certain plant process:*



(a) What process was being investigated above?
(b) What observation was made if;
(i) The experiment was left in strong wind for one hour?
(ii) All the leaves were removed from the plant?

13. *How is aerenchyma tissue adapted to its function*

14. *(a) State three structural differences between arteries and veins in mammals*
(b) Name a disease that causes thickening and hardening of arteries

15. *Identify two forces that help in upward movement of water in plants*

16. *State three ways in which red blood cells are adapted to their functions*

17. *(a) Distinguish between tissue fluid and lymph*
(b) Explain why deficiency of vitamin K leads to excessive bleeding even from small cuts

18. *Name the type of circulatory system found in the phylum Arthropoda*

19. *Name the blood vessel that nourishes the heart*

20. *a) In which form is oxygen transported in the blood.*
b) Why do plants not take in oxygen during the day although they need it for respiration

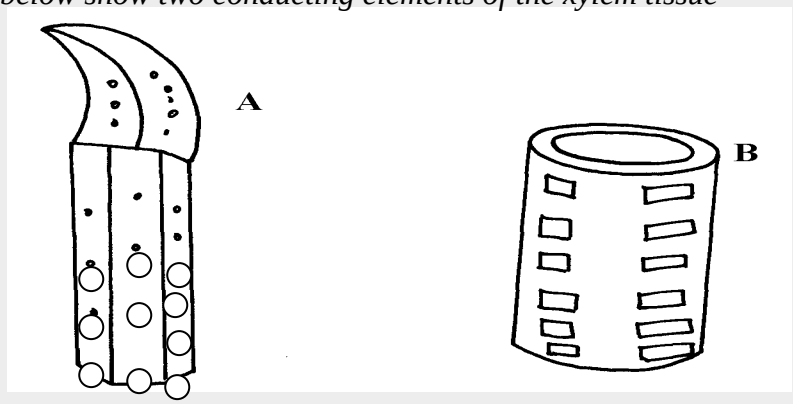
21. *Name a disease of the blood characterized by excessive production of white blood cells*

22. *Laboratory analysis of a patient's urine revealed the following concentration of various substances:*

Blood proteins	*0.00%*
Water	*50%*
Glucose	*48%*
Salts	*0.8%*
Urea	*1.2%*

a) From the analysis above, which disease is the patient suffering from
b) Name two symptoms of the disease in 3(a) above

23. *The diagrams below show two conducting elements of the xylem tissue*



a) Identify each of them A and B

b) What makes the cellulose side walls of both A and B able to prevent collapsing?

24. *Explain why the rate of transpiration is reduced when humidity is high*

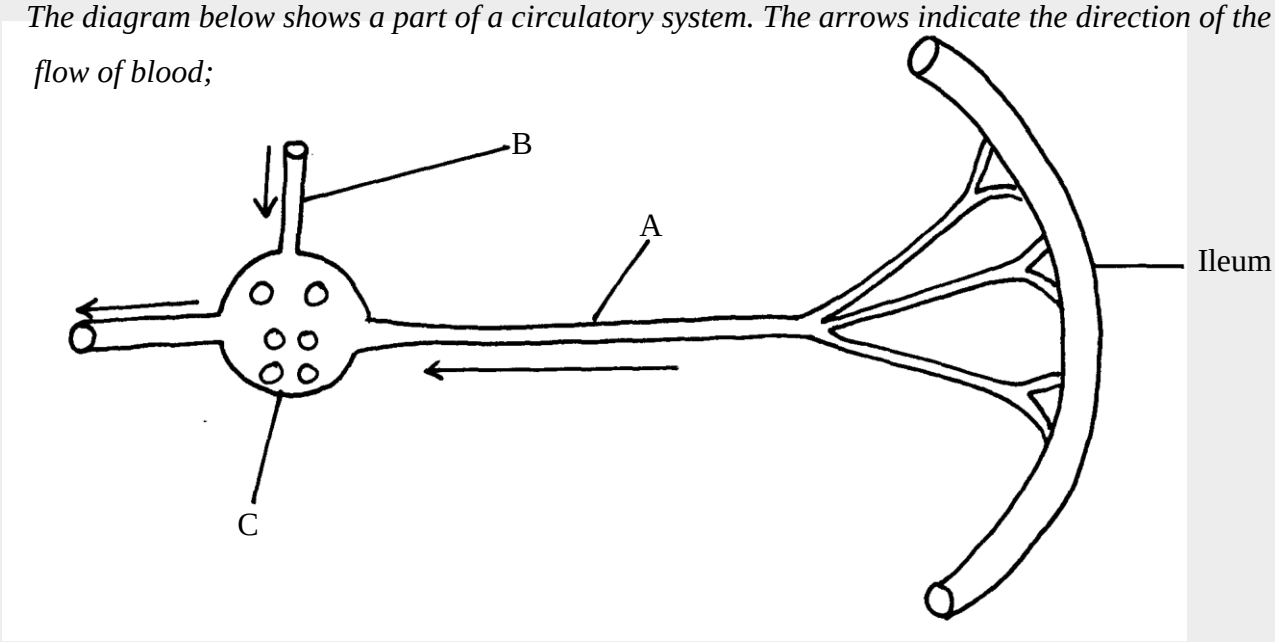
25. *(a) State two functions of the xylem vessels,*

(b) List two structural adaptations that make xylem vessels suitable to their function

26. *(a) What is peristalsis?*

(b) Explain how the process above is brought about.

27. *The diagram below shows a part of a circulatory system. The arrows indicate the direction of the flow of blood;*



(a) Identify the blood vessels labeled A and B

(b) Explain why it is important to transport food substances to organ C before being released for circulation to the rest of the body

28. *Name four methods plants employ to remove excretory waste products*

29. *a) State the form in which oxygen is transported in the mammalian blood*

b) Why is it dangerous to sleep in an enclosed room with a burning jiko

c) Why do plants not take in oxygen during the day although they need it for respiration

30. *Name a disease of blood characterized by excessive – production of white blood cells*

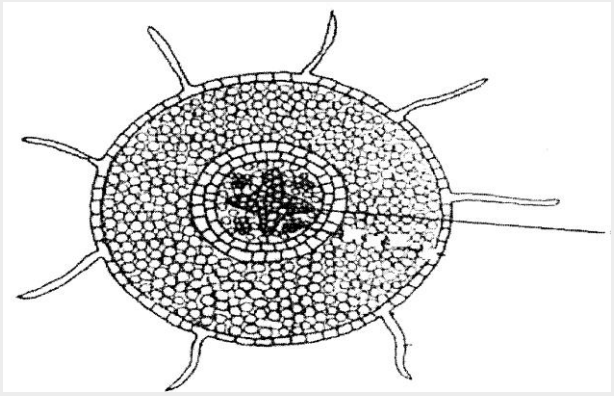
31. *The table below is a representation of a chromosomal mutation*

Before mutation	*L*	*M*	*N*	*O*	*P*	*Q*
After mutation	*L*	*O*	*N*	*M*	*P*	*Q*

(a) Name the type of chromosomal mutation represented above

(b) Name one mutagenic agent

32. *The diagram shows a section through a plant organ.*



(a) (i) Name the class of the plant from which the section was obtained belong.

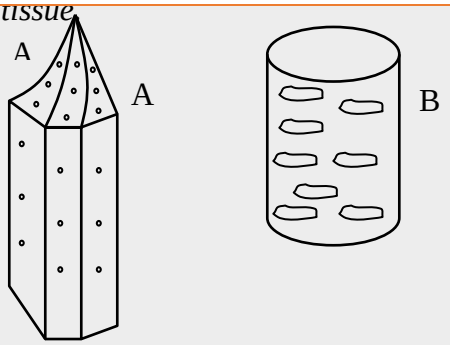
(ii) Give a reason for your answer in (a)(i) above

(b) How is the part labelled C adapted to its functions?

33. *State two roles of transpiration to a plant*

34. *Uptake of water by plants is not affected by metabolic poisons. Explain.*

35. *The diagram below represents a plant tissue*

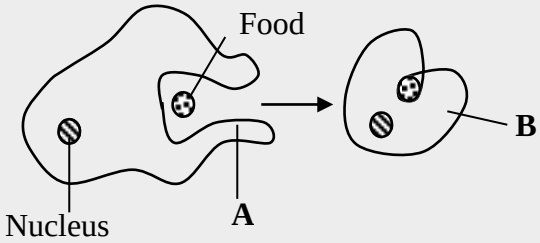


(a) Identify each of them.
(b) What property makes B to be more efficient in function?
(c) What makes the walls of both A and B impermeable to water and solutes?

36. *A woman gave birth to a child of blood group B+ (B positive). Name the two antigens that determined her child's blood group.*

37. *A transfusion of RH^+ blood was given to a patient with Rh^- blood. After one week a similar transfusion was given to the same patient. What was likely to be the effect of the second transfusion?*

38. *The diagrams below show stages in the process of feeding shown by amoeba.*



(a) Name the part labeled A.
(b) Name the process illustrated in the diagram above.
(d) Name the type of cell in human beings that exhibit this process.

39. *(a) Why are xylem vessels more efficient in the transport of water than tracheids?*
(b) What is the significance of xylem vessels being dead?

40. *Distinguish between guttation and transpiration*

41. *Other than transport, state one other function of xylem tissue in plants*

42. *State two functions of aerenchyma tissue in plants*

43. *(a) What is sickle-cell anaemia?*
(b) Identify the part of the heart that initiates the heart beat

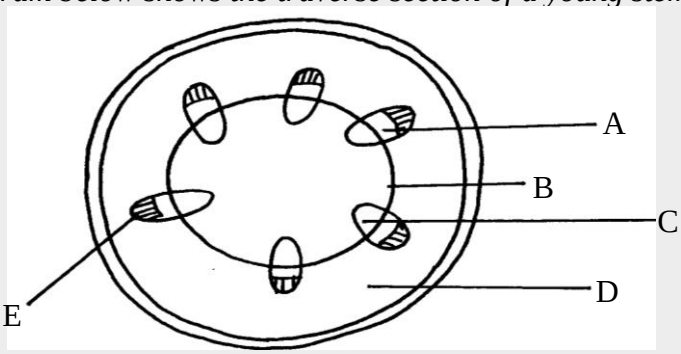
44. *(a) Give a reason why the left ventricle muscles are thicker than the right ventricles muscles*
(b) State the forms in which carbon (IV) oxide is transported in the blood

45. *Explain how the following adaptation reduce transpiration in xerophytes*

(a) Sunken stomata
(b) Thick waxy cuticle

46. *Name the: (a) Material that strengthens xylem tissue*
(b) Tissue that is removed when the bark of a dicotyledonous plant is ringed

47. *The diagram below shows the traverse section of a young stem.*

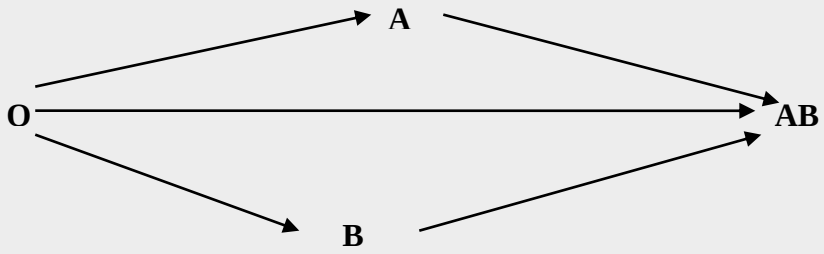


(a) What are the functions of the structures labeled A, B and C
(b) What type of cells are fonjd in the parts labeleld D
(c) Name the tissue labeled E

48. *Name the components of blood that do not enter the renal tubule in mammals*

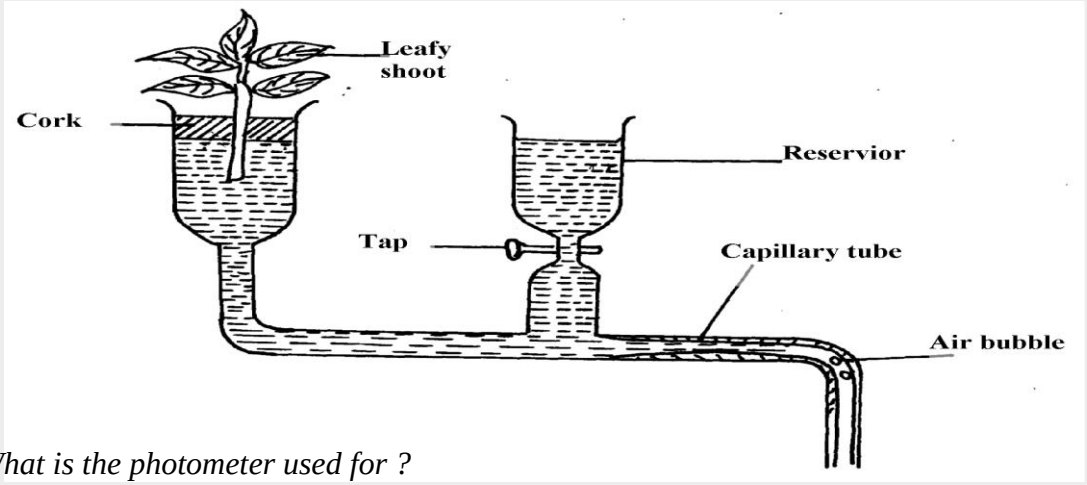
49 *Outline the route taken by a molecule of glucose from the ileum up to the kidney.*

50. *The flow chart below shows a blood transfusion pathway*



(a) What three conclusions can you draw from the flow chart?
(b) State two precautions that must be observed during blood transfusion
(c) Explain how blood clot is formed once a blood vessels is injured

51. *The figure below represents a diagram of a photometer;*



(a) What is the photometer used for ?
(b) State the precautions which should be taken when setting up a photometer
(c) Explain what you will expect if set up was placed under the following environmental conditions;
(i) Dark room
(ii) Leafy shoot enclosed in polythene bag
(iii) In a current of air created by a fan

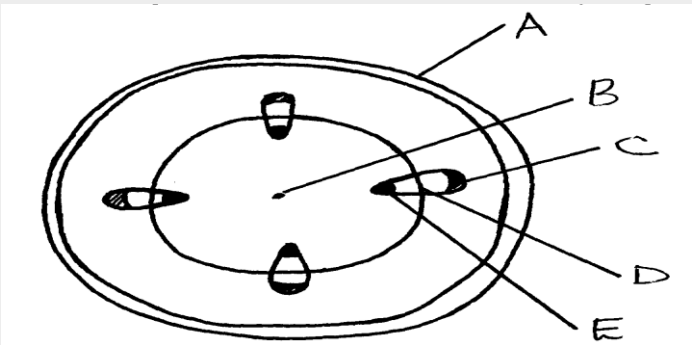
52. *The amount of blood flow through various parts of the body of a mammal was measured in cm^3 per minute at rest and during different physical activities. Results are shown below.*

	Blood flow in cm^3/min		
	At rest	*During light Exercise*	*During strenuous Exercise*
Heart muscles	*200*	*300*	*1050*
Gut	*1300*	*1000*	*400*
Skeletal muscles	*1100*	*5050*	*23000*
Kidneys	*900*	*650*	*250*
Skin	*400*	*1300*	*600*

a) Calculate the percentage change in blood flow through the skeletal muscles and gut when the mammal was exposed to strenuous exercise.
i) Skeletal muscles
ii) Gut

b) Account for the differences in amount of blood flow through the gut and skeletal muscles;
i) At rest
ii) During streneous exercise
c) Account for the result obtained for the skin during light exercise
d) Name two substances which are removed from the body by the kidney

53. *The diagram below represents a transverse section of a young stem.*



(a) Name the parts labeled A, B and D
(b) State the functions of the parts labeled C and E
(c) List three differences between the section above and the one that would be obtained from the root of the same plant

54. *Describe the functions of the various components of the mammalian blood*

6. GASEOUS EXCHANGE IN (A) PLANTS (B ANIMALS

1. *a) Name the site of gaseous exchange during breathing in mammals.*
b) State three characteristics of the site named in (a) above.
2. *Why would carboxyhaemoglobin lead to death?*
3. *State two causes of coronary thrombosis*
4. *What adaptation do red blood cells have for transportation of carbon (IV) oxide?*
5. *(a) What is Respiration Quotient (RQ)?*
(b) (i) Calculate the RQ of the food substance shown by the equation below.
$2C_{51}H_{98}O_6 + 145\ O_2 \longrightarrow 102CO_2 + 98H_2O + Energy$
(ii) Name the food substance being oxidized in b (i) above.
6. *Outline three ways in which the gills of Tilapia fish are modified to perform their function.*
7. *Identify the surfaces of gaseous exchange in the following:-*

(i) Paramecium;
(ii) Roots;
(iii) Frog;

8. *(a) Name two gaseous exchange*
(b) Explain how oxygen gets into the haemolymph of an insect
10. *(a) Outline two physiological changes that occur in the body to lower the level of Carbon (IV) Oxide after vigorous physical exercise*
(b) Name the site of respiration in a cell
11. *What is the importance of counter current flow in the exchange of gases in a fish*
12. *State four ways in which red blood cells (RBC) are adapted to the their function*
13. *(a) (i) Where in a cell does glycolysis take place?*

(ii) Name the product of the above process

(b) Briefly explain Kreb's cycle in a plant cell during anaerobic respiration

14. Describe the changes that occur to the rib cage and the diaphragm during inspiration

15. a) What is translocation
b) Name two forces that maintain transpiration stream

16. Most carbon (IV) oxide is transported form tissues to the lungs within the red blood cells and not in the blood plasma. Give two advantages of this mode of transport

17. Give a reason why halophytes have pneumatophores

18. Give two characteristics of respiratory surfaces in animals

19. Give a reason for each of the following on mammalian Red blood cells

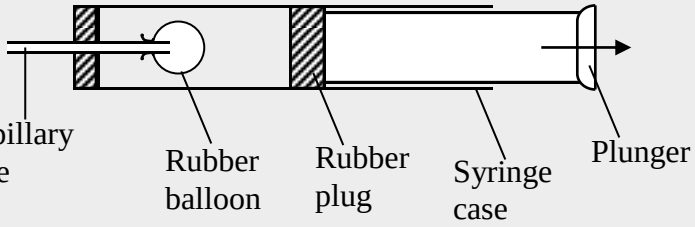
(a) Absence of the nucleus
(b) Biconcave shape

20. State two ways in which bodies of people living in high altitude areas respond to low oxygen concentration.

21. Explain what would happen to a mammalian Red blood cell 30 minutes alter being placed in distilled water.

22. (a) State two ways in which the surface area of the fish filaments is increased for efficient gaseous exchange.
(b) What is the importance of counter flow system in the filaments of a fish.

23. The apparatus below illustrates breathing in mammal.



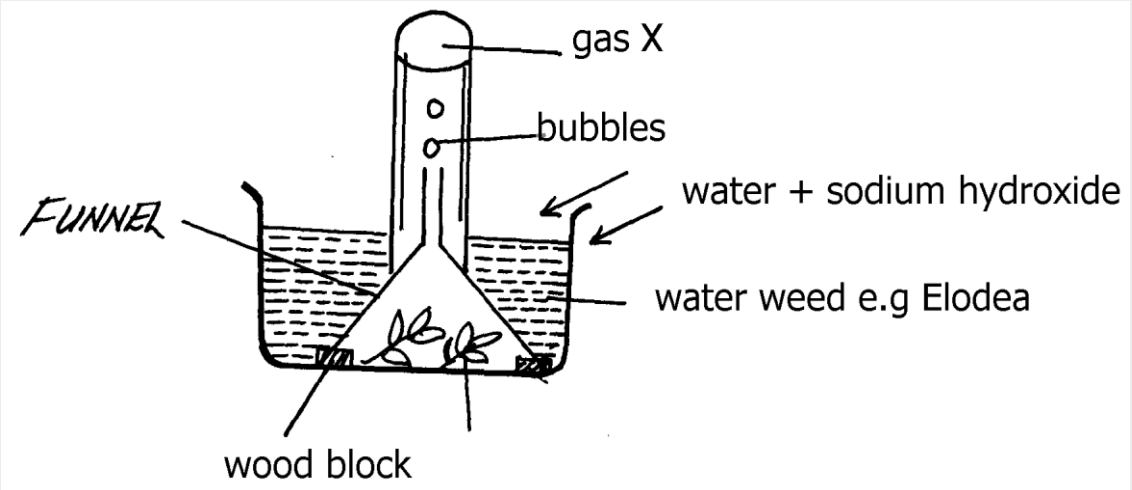
Describe what happens if the rubber plug is pulled in the direction shown by the arrow.

24. Describe the path taken by oxygen gas from atmosphere to the tissues of an insect.

25. Why should respiratory surfaces be: (i) Moist
(ii) Thin

26. The set up below represents an experiment to investigate the process of photosynthesis.

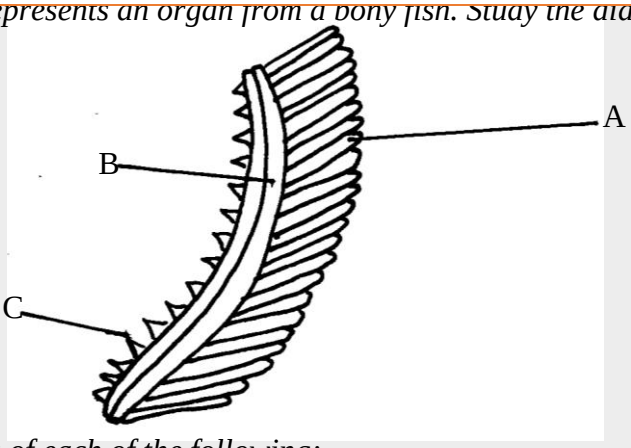
The set up placed in sunlight for six hours.



(a) Why was sodium hydrogen carbonate added to water in this experiment?
(b) Explain why the number of bubbles reduced by evening
(c) Explain why the water was used in this experiment
(d) Explain why the water was used in this experiment

27. *(a) State two adaptations of red blood cell to its functions*
(b) Name two ways in which carbon (IV) Oxide is transported in mammalian blood

28. *The diagram below represents an organ from a bony fish. Study the diagram and answer the questions that follow:*



(a) State the functions of each of the following:
(b) How is the structure labeled C adapted to its function?

29. *State how the tracheal system in insects is adapted for gaseous exchange.*

30. *Differentiate between active immunity and passive immunity*

31. *Name three sites where gaseous exchange takes place in terrestrial plants.*

32. *An athlete training to take part in an international competition moved to a high attitude area where*

he was to train for twelve days before the competition. He took his pulses per minute daily and

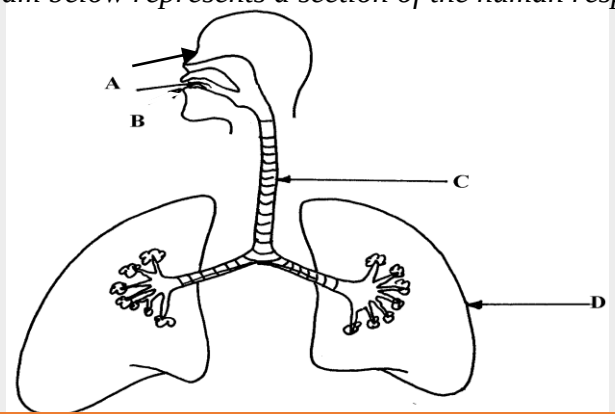
DAY	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
PULSES PER MINUTE	*72*	*78*	*89*	*92*	*92*	*90*	*86*	*80*	*77*	*74*	*72*	*72*

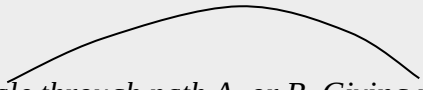
tabulated them as shown below:-

a) Other than pulse rate, name one other process which was affected by change of altitude
b) Account for the change in pulse rate from:- i) Day 1 to day 7
ii) Day 8 to day 12
c) Explain the advantage this athlete has over the one who trains in a lower altitude area
d) The equation below represents a reaction which takes place during rapid muscular movements in humans.
Glucose ⟶ Lactic acid + 150KJ
i) State two effects of this reaction to an individual
ii) How is lactic acid finally eliminated from the muscle tissues of the human after the muscle

33. *a) State any two structures used for gaseous exchange in plants.*
b) Name any two sites where gaseous exchange takes place in a leaf of a terrestrial plant.
c) State any two types of leaves and their respective functions.
d) Briefly describe how stoma opens.

34. *The diagram below represents a section of the human respiratory system:*





(a) One can inhale through path A, or B. Giving reasons, state the more appropriate path.

(b) How is the part labbelled C adapted for its function?

(c) Explain the effect of regular tobacco smoking to the functioning on the organ labelled D

35. *(a) How is the structure of mammalian gaseous exchange system adapted to its functions*
(b) Describe the mechanism of opening and closing of the stomata using the photosynthetic theory

36. *(a) Describe the mechanism of inhalation in man.*
(b) Using photosynthetic theory explain the mechanism of opening of stomata.

37. *In an experiment to investigate a certain processes in a given plant species, the rate of carbon (IV) oxide consumed and released were measured over a period of time of the day. The results of the investigation are shown in the table below:*

Time of the day (hours)	*6*	*8*	*10*	*12*	*14*	*16*	*18*	*20*	*22*	*24*
Carbon (IV) oxide consumed in mm^3/min	*10*	*43*	*69*	*91*	*91*	*50*	*18*	*0*	*0*	*0*
Carbon (IV) oxide released in mm^3/min	*38*	*22*	*10*	*3*	*3*	*6*	*31*	*48*	*48*	*48*

b) Name the biochemical processes represented by;
(i) Carbon (IV) oxide consumption
(ii) carbon (IV)oxide release
(c) Account for the shape of the curve for carbon (IV) oxide consumption between;
(i) 6-16 hours
(ii) 20-24 hours
(d) Account for carbon (IV) oxide released between 12-16 hours
(e) (i) What is compensation point?
(ii) From the graph state the time of the day when the plant attains compensation point
(f) Explain how high temperature above optimum affects the rate of carbon (IV) oxide consumption in the plant.

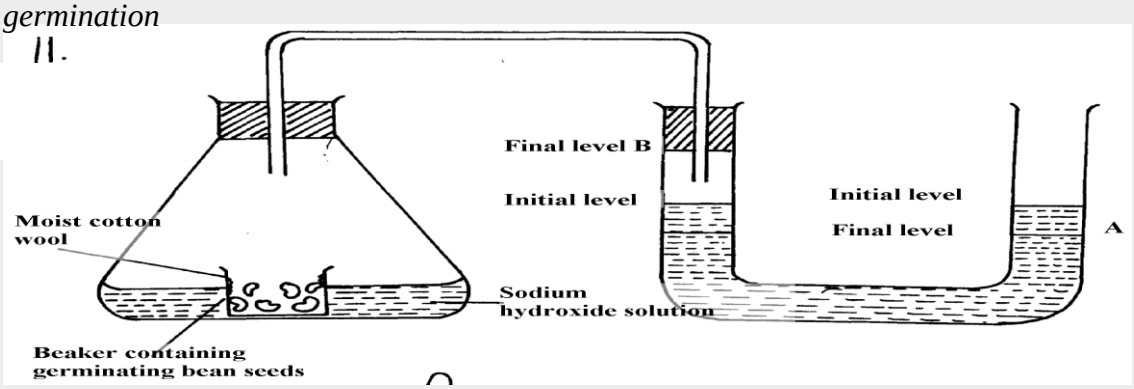
7. RESPIRATION

1. *(a) Distinguish between gaseous exchange and respiration*
(b) Name the products of anaerobic respiration in plants
2. *(a) State two phases of aerobic respiration*
(b) With a reason, state the phase that yields more energy
3. *A process that occurs implants is represented by the equation below:-*

$C_6H_{16}O_6 \longrightarrow 2C_2H_5OH + 2CO_2 + Energy$
(Glucose) (Ethanol) (Carbon (IV) Oxide)

(a) Name the process
(b) State the economic importance of the process named in (a) above
4. *Give a reason why it is difficult to calculate respiratory quotient (RQ) in plants*
5. *a) Explain what is meant by the term oxygen debt in human beings*
b) What are the end products of anaerobic respiration in animals

6. *The apparatus below was set up by a student to find out the changes in gases during germination*



a) After 48 hours the level of water in the U-tube at A and B was as shown. Explain the observation

b) Calculate the respiration quotient (RQ) from the equation below:-

$2C_{51}H_{98}O_6 + 145O_2 \longrightarrow 102\ CO_2 + 98H_2O + Energy$

c) Identify the substrate being respired in the above equation

7. *One molecule of lipid gives more energy than one molecule of glucose when respired aerobically but it is NOT always used as a respiratory substrate*

a) Give two reasons for this

b) Name two disaccharides which are reducing sugar

8. *(a) (i) Where in a cell does glycolysis take place?*

(ii) Name the product of the above process

(b) Briefly explain Kreb's cycle in a plant cell during anaerobic respiration

9. *How is the mammalian skin adapted to its protective function?*

10. *The oxidation state of a certain food is represented below by a chemical equation:-*

$2\ C_3H_2O_2N + 6O_2 \longrightarrow (NH)_2CO_2 + 5CO_2 + 5H_2O$

a) Calculate the respiratory quotients (RQ) of the food substrate

b) Identify the food substrate

11. *Whooping cough is a disease of the respiratory system name the causative agents and give two symptoms*

12. *How does the sunkness of stomata help in minimizing the rate of transpiration in plants*

13. *State two roles of adrenaline in man*

14. *Explain why a rat, though small eats more frequently than an elephant*

15. *Active yeast cells were added to dilute sugar solution in a container. The mixture was kept in a warm room. After a few hours bubbles of a gas were observed escaping from the mixture*

(a) Write an equation to represent the chemical reaction above

(b) State two economic importance of this type of chemical reaction in industry?

16. *(a) Give two reasons why fats are not the main respiratory substrates in the body of a mammal and yet they give a lot of energy when oxidized.*

17. *The equation below summarizes a metabolic process in plants.*

Glucose $\longrightarrow$ *Ethanol + carbon (IV) oxide+ Energy*

State two industrial applications of the above equation.

18. *(a) Differentiate between respiration and respiratory surface.*

(b) Why is an effective respiratory system often associated with a circulatory system.

19. *State two reasons why lipids are rarely used as a respiratory substrate compound to carbohydrates.*

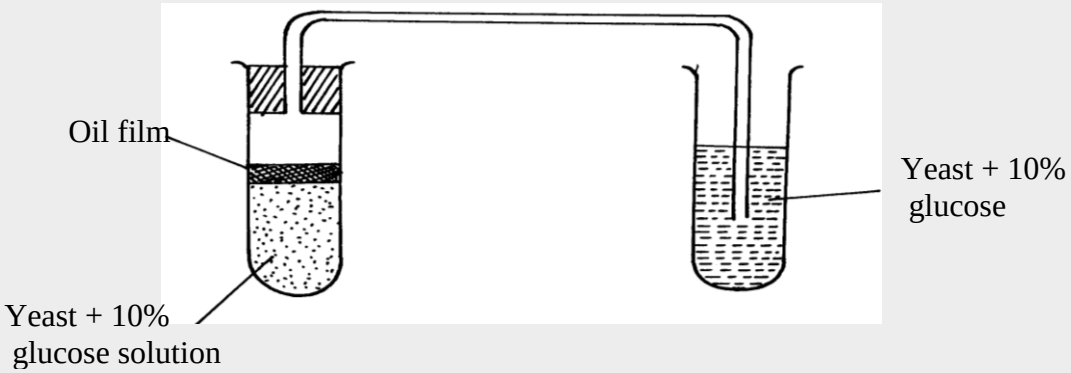
20. *The equation below shows respiration for a certain food substrate. Study it and answer questions that follow:*

$2C_{51}H_{98}O_6 + 145O_2 \longrightarrow 102CO_2 + 98H_2O$

(a) Calculate the respiratory Quotient, RQ

(b) Suggest with reasons the possible food substrate

21. *The apparatus below was used to investigate anaerobic respiration:-*



(a) How would you remove dissolved oxygen from the glucose before the experiment commencing?

(b) State what happens to the lime water as the experiment proceeds to the end

(c) Describe the reactions in the experiment

(d) Explain what would happen if the temperature of glucose solution and yeast was raised beyond 45°C?

8. EXCRETION AND HOMEOSTASIS

1. *Explain the following:-* *i) Fresh water fish excrete ammonia*

   ii) Glucose is absent in urine yet present in glomerular filtrate

2. *(a) State two functions of the kidney*

   (b) Name two substances that are not found in urine of a healthy person

   (c) Name two diseases that affect the kidney

3. *(a) State two structural modification of the kidneys of deserts animals like kangaroo rat.*

   (b) Describe how ingestion of very salty food may reduce the amount of water excreted in urine.

4. *A student mixed a sample of urine from a person with Benedict's solution and heated, the colour changed to orange.*

   (a) What was present in the urine sample?

   (b) What did the student conclude on the health status of the person?

   (c) Which organ in the person may not be functioning properly?

5. *(a) If the human pancrease is not functional:-*

   (i) Name the hormone which will be deficient

   (ii) Name the disease the human is likely to suffer from

   (b) What is diuresis?

6. *State one structural adaptation of nephron in the kidney of a desert mammal*

7. *Name the nitrogenous wastes excreted by the following organisms:-*

Animal	*Nitrogenous Waste*
(i) Desert mole	
(ii) Marine fish	

(iii) Tilapia

8. *The table below shows description of sizes of glomeruli renal tubules of two animals which are living in different environments*

	Animal X	*Animal Y*
Glomeruli	*Large and few*	*Small and many*
Renal tubules	*Short*	*Long*

(a) Name the likely environment in which each animal lives : *(i)Animal X*
(ii) Animal Y

(b) What role does vasoconstriction play in thermoregulation?

9. *The table below shows the approximate percentage concentration of various components in blood plasma entering the kidney, glomerular filtrate and urine of a healthy human being*

Component	*Plasma*	*Glomerular filtrate*	*Urine*
Water	*90*	*90*	*94*
Glucose	*0.1*	*0.10*	*0.00*
Amino acids	*0.05*	*0.05*	*0.00*
Plasma proteins	*8.0*	*0.00*	*0.00*
Urea	*0.03*	*0.03*	*2.00*
Inorganic ions	*0.72*	*0.72*	*1.50*

(a) Name the process responsible for the formation of glomerular filtrate
(b) What process is responsible for the absence of glucose and amino acids in urine?
(c) Explain why there are no plasma proteins in the glomerular filtrate?

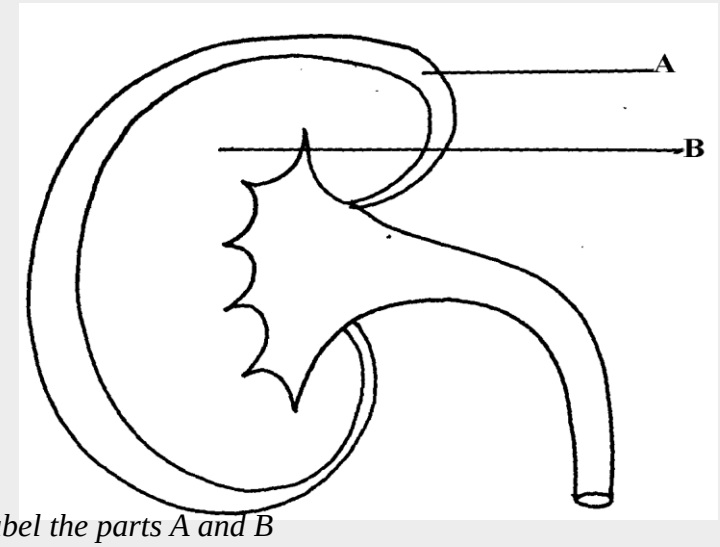
10. *What is the importance of sebaceous glands in the human skin?*

11. *Explain why sweat accumulates on a person's skin in a hot humid environment*

12. *Distinguish between diabetes mellitus and diabetes inspidus*

13. *State two processes through which plants excrete their metabolic wastes.*

14. *The figure below shows a vertical section through a mammalian kidney.*

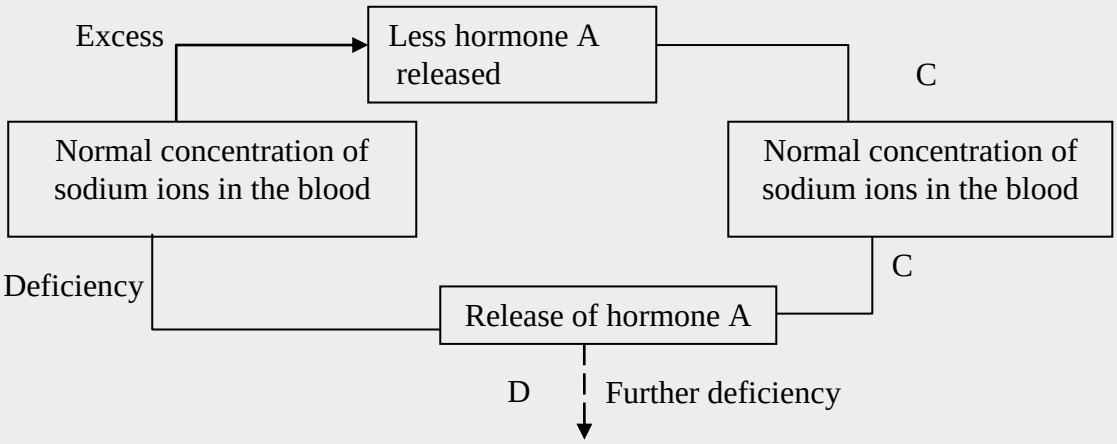


(a) Label the parts A and B
(b) Which part is the Bowman's capsule found?

15. *(a) Explain the effects of the production of large amounts of Antidiuretic hormone in the human body*

(b) State two functions of the loop of Henle

16. *Study the homeostatic scheme below:*



(a) Identify the hormone labeled A
(b) Name the site of action of hormone A
(c) Identify the feedback labeled D

17. *State three importance of Osmosis in plants*

18. *A patient was complaining of thirst most of the times. A sample of the patient's urine was found not to contain a lot of sugar but was dilute:-*

(a) Name the hormone the person's body was deficient of
(b) Which gland produces the above hormone
(c) Name the disease that the patient was most likely suffering from

19. *State two features in the nephron that facilitate ultra filtration*

20. *The table below shows a description of size of glomeruli and renal tubules of two animals which are adapted to living in different environment:-*

	Animal A	*Animal B*
Glomeruli	*large and few*	*small and many*
Renal tubules	*short*	*long*

a) Name the likely environment in which animal A lives
b) Suggest the main nitrogenous waste produced by animal B
c) Name the organelle of osmoregulation in each of the following animal: i) Paramecium
ii) Insects

21. *What role is played by the liver in excretion?*

22. *The equation below represents a metabolic process that occurs in the mammalian liver:*

Amino acids $\xrightarrow{\text{Enzymes}}$ *organic compound + urea*

a) Name the process
(b) What is the importance of the process to the mammals?

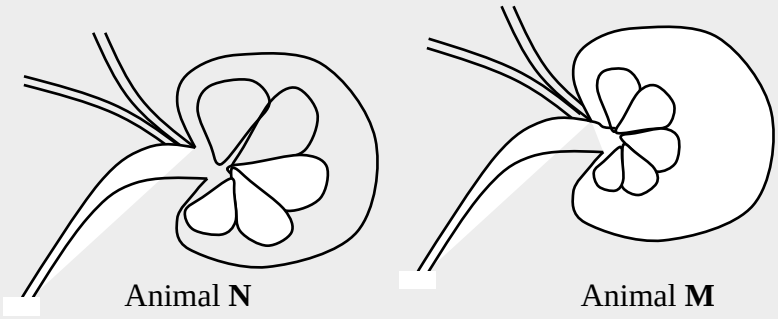
23. *A person was found to pass out large volume of dilute urine frequently. Name the:-*

(a) disease the person was suffering from?
(b) hormone that was deficient

24. *Explain the effects of the following on the quantity and composition of urine*
(a) Drinking large amount of clean water
(b) Drinking very salty soup
(c) Removal of pancreas

25. *(a) Distinguish between excretion and egestion*
(b) State the importance of excretion in the bodies of living organisms.

26. *The diagram below shows simplified structures of kidneys from two different animals.*

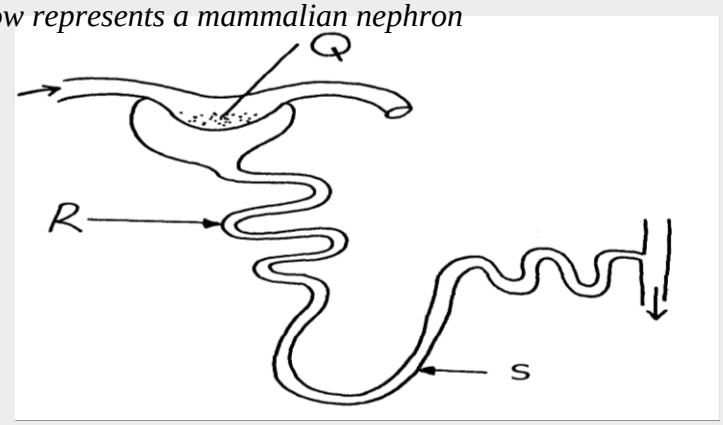


Animal **N** Animal **M**

(a) Suggest possible habitat in which animal N is found.
(b) Give two reasons for your answer in (a) above.

27. *(a) What is poikilotherm?*
(b) State two classes of phylum chordata where all members are poikilothermic .

28. *The diagram below represents a mammalian nephron*

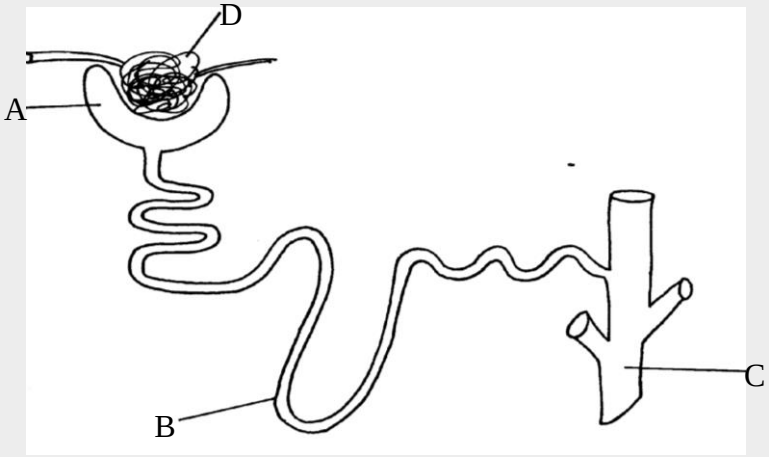


(i) Name the structure labelled Q .....

(ii) State two adaptations of part labeled R

29. *Distinguish between internal environment and external environment as used in*

30. *The diagram below represents a nephron of a mammal:*



(a) Name the parts labeled A, B and D
(b) Name a major substance in glomerular filtrate whose concentration remains the same between A and C

31. *Name the parts of the flower that are responsible for the production of gametes*

32. *The equation below represents a metabolic process that occurs in a certain organ in the m mammalian body:-*

Ammonia $\xrightarrow{\text{enzymes}}$ *Organic compound Q + water*

Carbon (IV) oxide

a) Name the process represented in the equation.
b) Name the organ in which the process occurs.
c) Why is the process important to the mammal?
d) Identify the organic compound Q.
e) Explain the source of ammonia in the organ named in (b) above.
f) What happens to organic compound Q?

33. *Kosgei and Onyancha collided during a football match and each got bruised. Kosgei's bruise stopped bleeding after ten minutes while Onyancha's bruise continued bleeding and he had to be taken to hospital for treatment.*

(a) Explain the process which brought about stoppage of Kosgei's bleeding
(b) Distinguish between blood clotting and haemagglutination.
(c) Name the disease, that Onyancha could be suffering from.

34. *The table below shows the percentage of some substances in the glomerular filtrate and urine of a certain mammal:-*

Substances	*Contents in glomerular filtrate*	*Contents in urine*
Water	*90*	*90*
Sodium ions	*0.3*	*0.35*
Chloride ions	*0.37*	*0.60*
Glucose	*0.1*	*0.0*
Urea	*0.03*	*2.0*
Proteins	*0.0*	*0.0*

(a) From the above table, account for ; (i) The absence of glucose in urine
(ii) The absence of protein in both glomerular filtrate and urine
(b) Explain the significance of the flow system in the nephron where the glomerular filtrate

flows in opposite direction to that of blood in the surrounding capillaries

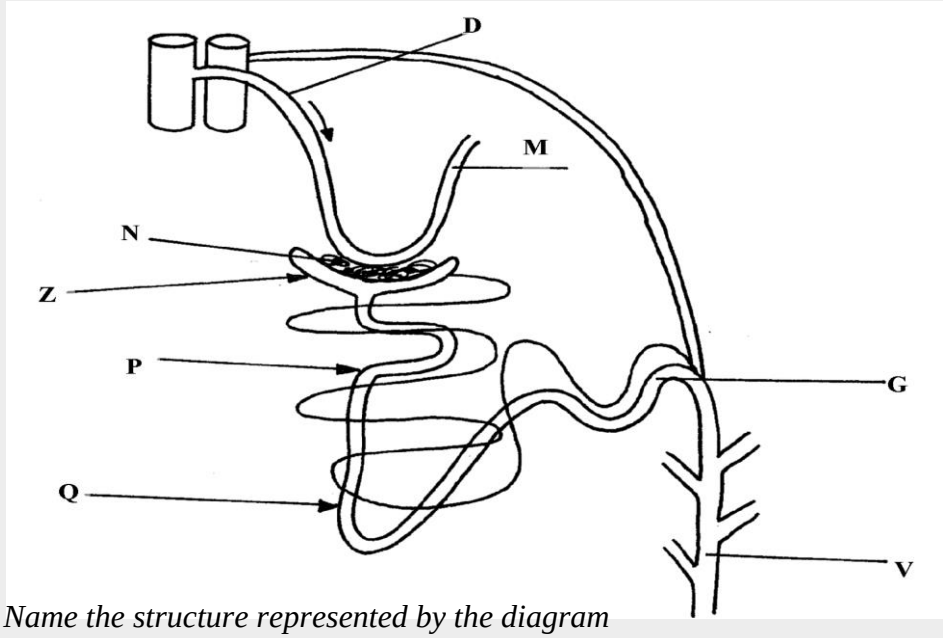
(c) Name the hormone that controls the percentage of water in urine and that which control the amount of salts

Percentage of water

Amount of salts

(d) List any two diseases /disorders of the kidney

35. *Study the diagram below and answer the questions that follow*



(a) Name the structure represented by the diagram

(b) (i) Name the parts labelled D and M

(ii) Name the hormones whose sites of action are Q and G

(c) Name one substance that is present in part N but absent in part Z

(d) The contents of part V were boiled with Benedicts' solution and an orange precipitate was formed. Account for the results

37. *An experiment was carried out to determine the effect of drinking on excess amount of water on the flow of urine. A person drinks one litre of water and urine was collected at intervals of 15minutes.*

The results were as shown below:

Time in minutes	*0*	*15*	*30*	*45*	*60*	*75*	*90*	*105*	*120*	*135*
Urine output ml/min	*1.6*	*1.6*	*1.6*	*5.4*	*9.0*	*9.0*	*7.6*	*3.0*	*0.8*	*0.8*

(a) Plot a suitable graph to represent urine output with time.

(b) Explain the rate of flow of urine between the following times;

(i) 15 and 60minutes.

(ii) 60 and 75minutes.

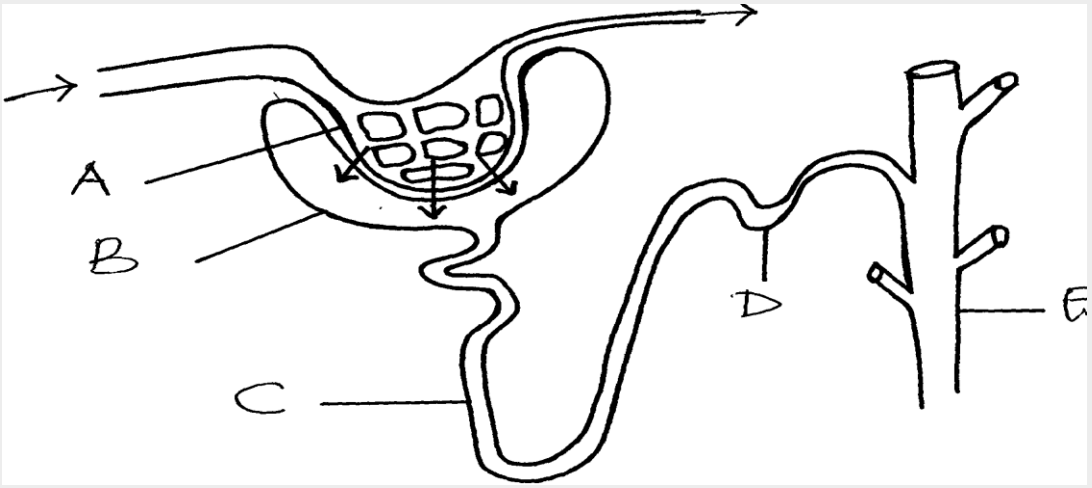
(iii) 75 and 135 minutes.

(c) Name two hormones responsible for regulation of relative amount of salts and water in man.

38. *a) Explain how urea is formed in the human body*

b) Describe the path taken by urea from the organ where it is formed until it is released from the human body

39. *The diagram below represents a mammalian nephron.*

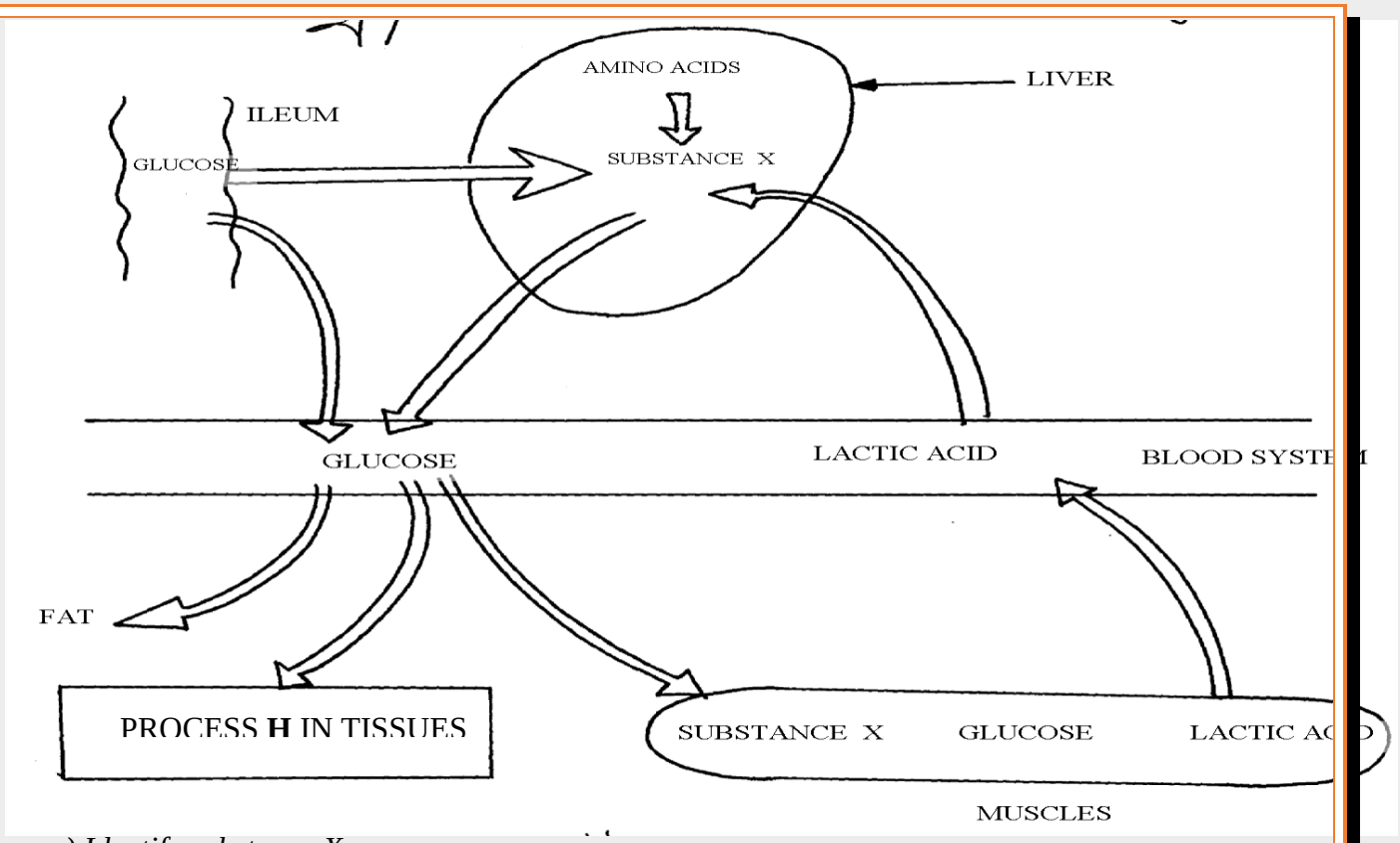


(a) Name the structures labeled B,C and D

(c) Name the process by which substances are reabsorbed from structure C into blood capillaries

(d) How is the pressure in structure A achieved?

40.

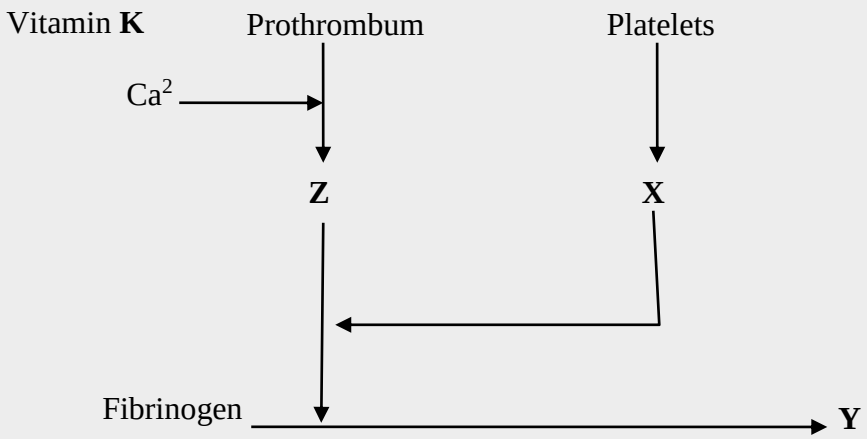


a) Identify substance X

(c) Give the end products of the process labelled H

(d) Give three other functions of the liver

41. *The flow diagram below represents blood clotting process*



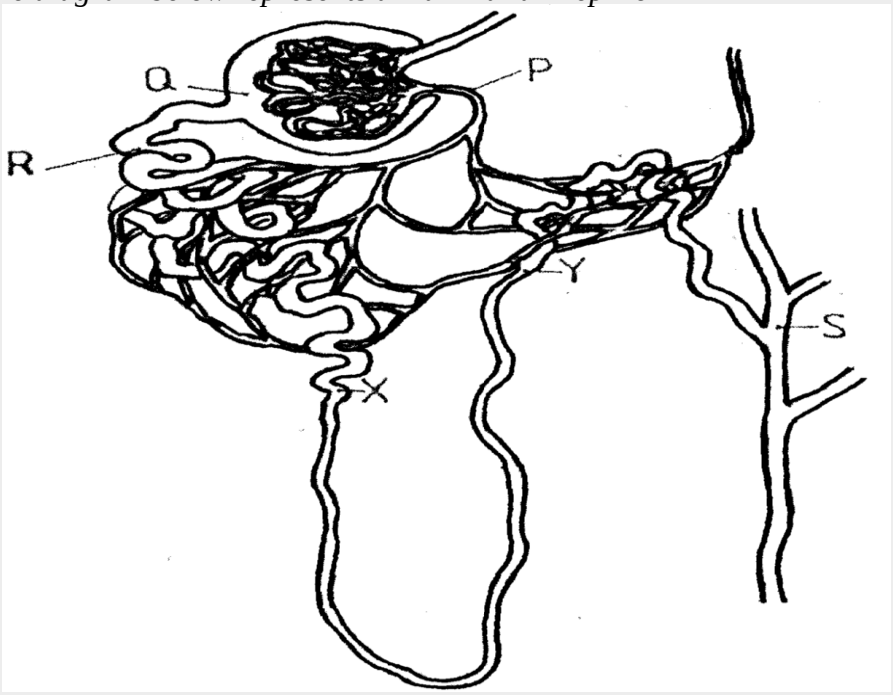
a) Name the proteins represented by the letters; V, Y, Z

b) State the importance of blood clotting

c) Why doesn't the physiological process above occur in undamaged blood vessels

42. *How does an Endotherm respond to both heat gain and heat loss?*

43. *The diagram below represents a mammalian nephron*



(a) Name the: (i) Structure labelled P

(b) State the structural modifications of the part label led Q for
(i) Desert mammals
(ii) Fresh water mammals

(c) (i) Name one substance present at point R but absent at point S in a healthy mammal.
(ii) The appearance of the substance you have named in (c)(i) above is a symptom of a certain disease. Name the disease

44. *Describe how the mammalian skin regulates body temperature*

9. ECOLOGY

1. *A student wanted to estimate the number of grasshoppers in 5km^2 grass field near the school compound.*

Using a sweep net he captured 36 grasshoppers. He used a red felt pen to mark the thorax of each insect before releasing back into the field. Three days later he made another catch of grasshoppers. He collected 45 grasshoppers of which only 4 had been marked with red mark.

a) Name the above method used in the population estimation
b) Calculate the population of grasshoppers using the above data

2. *What is the significance of the following in the ecosystem?*

a) Decomposers
b) Predators

3. *Birds feed on grasshoppers that feed on grass.*

a) Draw a possible food chain from the above information
b) Explain why the biomass of organisms decreases at each preceding trophic level.

4. *Define the following terms:-*

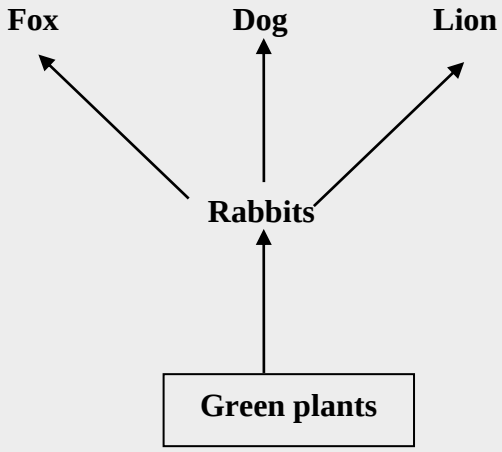
(i) Autecology ;
(ii) Biomass;

5. *State two most important factors that favour exponential growth of a population of gazelle in a park*

6. *(a) Distinguish between habitat and niche.*
(b) Explain why Biomass of producers is greater than that of primary consumers in a balanced ecosystem.
(c) State two advantages of a biological control method over the chemical control method of pests and parasites

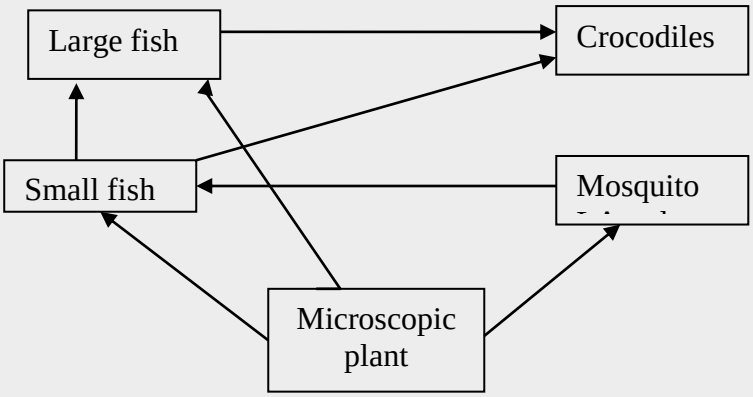
7. *Explain how oil as a pollutant may affect aquatic plants and animals?*

8. *The diagram below shows part of a food relationship in an ecosystem:-*



(a) Name the food relationship above
(b) How many trophic levels are shown in the diagram above?
(c) State main source of energy in the ecosystem

9. *Use the food web below to answer the questions that follow:-*



(a) Construct a food chain ending with crocodile as a quartenary consumer
(b) Name the organisms in the food web hat has only one predator

10. *50 black mice and 50 white mice were released in an area inhabited by a pair of owls. After four months, the mice in the area were recaptured and only 38 black mice and only a white mice remained.*

(a) How would you explain these results?
(b) Name the theory of evolution that support the results in (a) above

11. *In a certain school Form three class did an experiment to estimate the number of Tilapia in their fish pond. 725 tilapia were netted marked and released.*

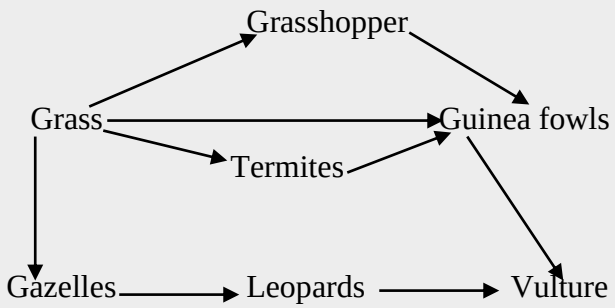
a) State the method used in this exercise
b) Calculate the tilapia population.
c) State two assumptions made by the students during the investigation

12. *An investigation was carried out on a terrestrial ecosystem. The population sizes and species biomass were determined and recorded as shown in the table*

SPECIES	*POPULATION SIZE*	*SPECIES BIOMASS*
A	$1x10^3$	$1x10^3$
B	$1x10^3$	$1x10^{-1}$
C	$1x10^5$	*1x10*
D	*1x10*	$1x10^4$

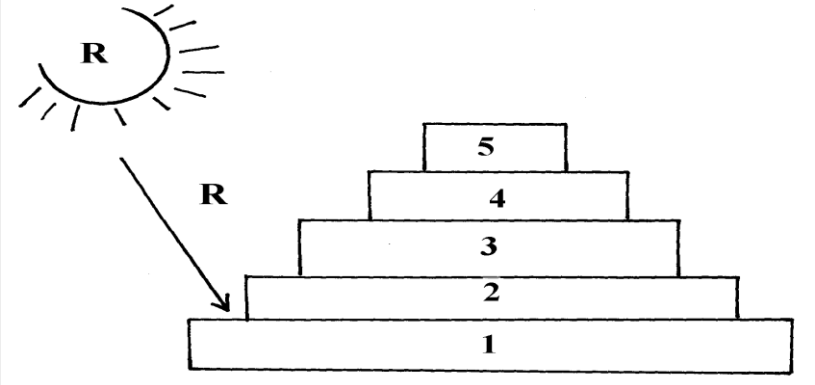
a) *If these organisms had a feeding relationship, construct a simple food chain involving all the organisms*
b) *Construct pyramid of numbers using the data provided above*
c) *State one disadvantage of using pyramid of number in expressing feeding relationships in ecological ecosystem*

13. *The figure represents a feeding relationship in an ecosystem*



(a) Write down the food chain in which the Guinea Fowls are secondary consumers
(b) What would be the short term effects on the ecosystem if lions invaded the area
(c) Name the organism through which energy from the sun enters the food web

14. *Outline three roles of active transport in human body*
15. *Distinguish between community and population*
16. *Describe how the belt transect can be used in estimating the population of a shrub in a grass land*
17. *A fish farmer wanted to know the number of fish in a pond. He collected 10 fish from the pond and labeled each, by a tag label on its fin and returned the ten fish to the pond to mix with other fish . When he later collected 50 fish from the pond, he found only four of them had labels*
a) Estimate the total number of fish in the pond (show your workings)
b) What two assumptions are being made in this methods of estimating population
18. *What is the importance of saprophlic fungi and bacteria in an ecosystem*
19. *i) Name one main cause of global warming*
ii) What are the effects of global warming
20. *Explain how saliva is important in digestion*
21. *Give a reason why two species in an ecosystem cannot occupy the same niche*
22. *Below is a pyramid of numbers indicating trophic levels:-*



(a) What do you understand by the term trophic level?

(b) Name the trophic level numbered 5 on the pyramid
(c) Name Q
(d)What is the significance of the arrow R

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. Later, it was observed that one population fed entirely on fruits and seeds, although insects were available. Name this type of evolutionary change*

24. *To estimate the population size of crabs in a certain lagoon, traps were laid at random. 400 crabs were caught, marked and released back into the lagoon. Four days later, traps were laid again and*

360 crabs were caught. Out of the 360crabs, 90 were found to have been marked
(i) Calculate the population size of the crabs in the lagoon
(ii) What is the name given to this method of estimating the population size

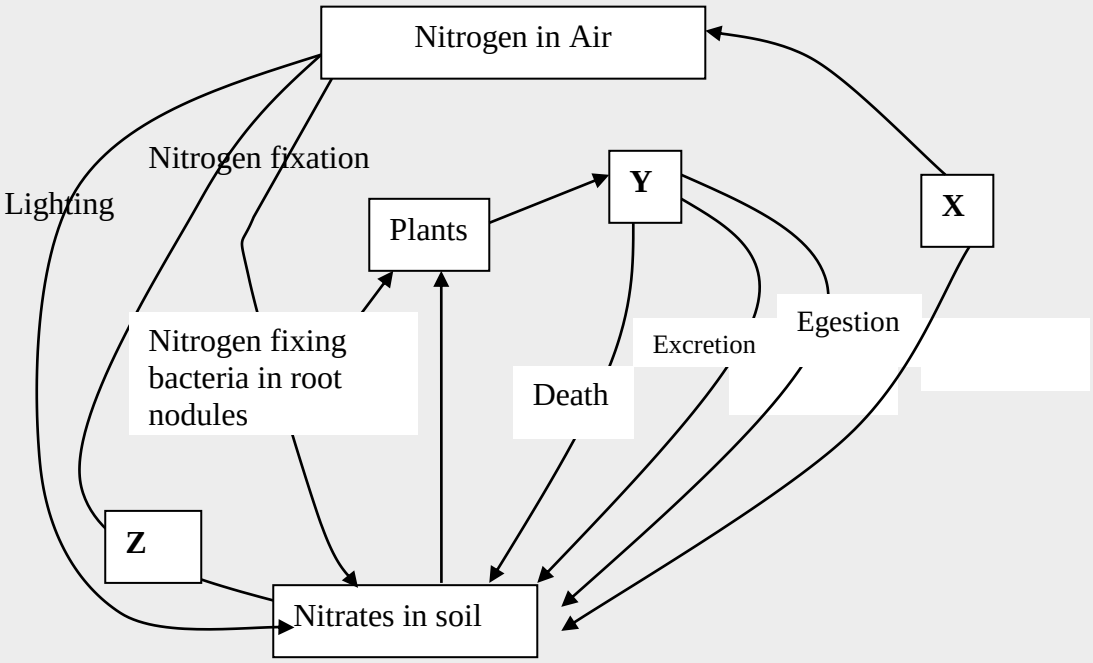
25. *State the function of each of the following apparatus:*
(a) Pooter …
(b) Sweep net ……..

26. *State the role of the following apparatus in the study of living things.*
(a) Sweep nets.
(b) Pooter.
(c) Pit fall trap.

27. *Name three density dependent factors in an ecosystem.*

28. *(a) What are the two main components of an ecosystem?*
(b) Apart from mere observation of actual feeding suggest two methods that can be used to determine the type of food eaten by animals

29. *The chart below represents a simplified nitrogen cycle.*



What is represented by X, Y and Z?

30. *In an ecological study, a locust population and that of crows was estimated in a grassland area over a period of one year. The results were tabulated as shown below.*

Months	*J*	*F*	*M*	*A*	*M*	*J*	*A*	*S*	*O*	*N*	*D*
No. of Adult locusts x 10^2	*90*	*20*	*11*	*25*	*200*	*652*	*15*	*10*	*35*	*192*	*456*
Number of crows	*4*	*2*	*0*	*1*	*8*	*22*	*2*	*1*	*1*	*5*	*15*
Amount of rainfall	*20*	*0*	*55*	*350*	*520*	*350*	*10*	*25*	*190*	*256*	*350*

a) Draw a graph of population of locusts and crows against time

b) i) State the relationship between rainfall and locust population

ii) Account for the relationship you have stated in b (i) above

c) What happens on the populations of locusts and crows in the months of January to March? Give a reason.

d) If the area of study was one square kilometer, state one method used to estimate the population of :- i) Locusts

ii) Crows

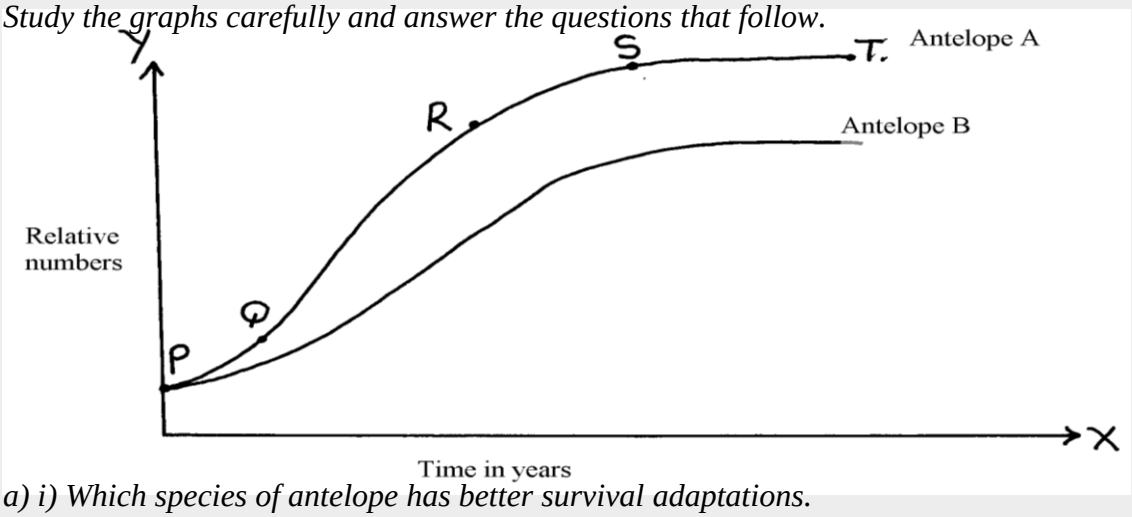
(e) (i) State the trophic levels of the (i) Locusts and (ii) crows

(ii) Construct a simple complete food chain involving these organisms

(f) If the locust were removed from the food chain, what would be its effect?

(g) Define biomass

31. *Two species of antelopes were introduced into an ecosystem at the same time in equal numbers. The graphs below show their relative numbers during the first eight years of their co-existence. Study the graphs carefully and answer the questions that follow.*



a) i) Which species of antelope has better survival adaptations.

ii) Give a reason for your answer above.

b) i) Name the type of curves shown.

ii) Name the phases labeled PQ, QR, RS, ST

c) Explain the shape of the curve for the species of Antelope A between

i) Q and R.

ii) S and T.

d) i) State the type of competition shown by the two species of antelopes.

ii) State any two symptoms of intraspecific competition in plants.

e) Suggest how the species B avoid competitive exclusion..

f) State any three adaptations that enable the antelopes to overcome predation.

g) State any two possible methods by which populations of the two antelopes' species were determined.

32. *Explain five abiotic factors that affect the ecosystem*

33. *The data shown below was taken from Savannah grassland habitat. Examine it carefully and then answer the questions that follow:-*

Organism	*Population*
Grasses	*1000*
Caterpillars	*500*
Squirrels	*300*
Frogs	*200*
Gazelles	*300*
Elephants	*100*
Snakes	*50*
Hunting dogs	*40*
Vultures	*40*

Lions	*40*
Hawks	*10*

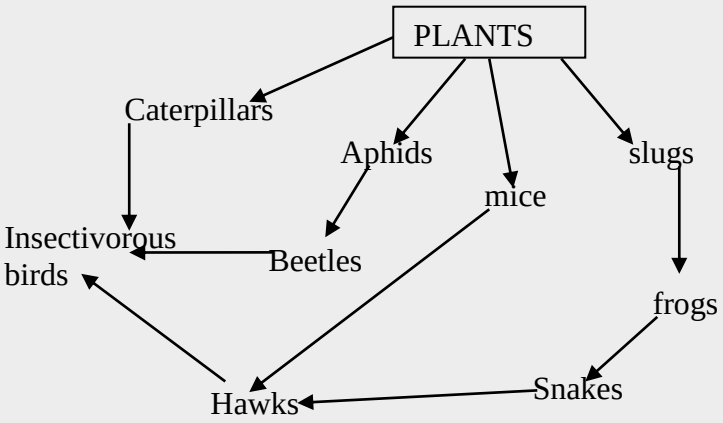
(a) Draw three food chains

(b) Draw a pyramid of numbers for a food chain with four trophic levels and indicate the trophic levels at which each member feeds

(c) State the effect of removing the hunting dogs

(d) Why is it advisable to feed 100kg of grain to man instead of using it to fatten steers then supply beef to human population?

34. *Study the following food web and answer questions that follow:*



(a) (i) Name the organisms that occupy the second trophic level

(ii) What is the other name for the second trophic level

(b) Write down two food chains from the food web that:

(i) End with hawks as tertiary consumer

(ii) End with hawks as quaternary consumer

(c) Giving reasons state; (i) the organism with largest biomass

(ii) the organism with least biomass

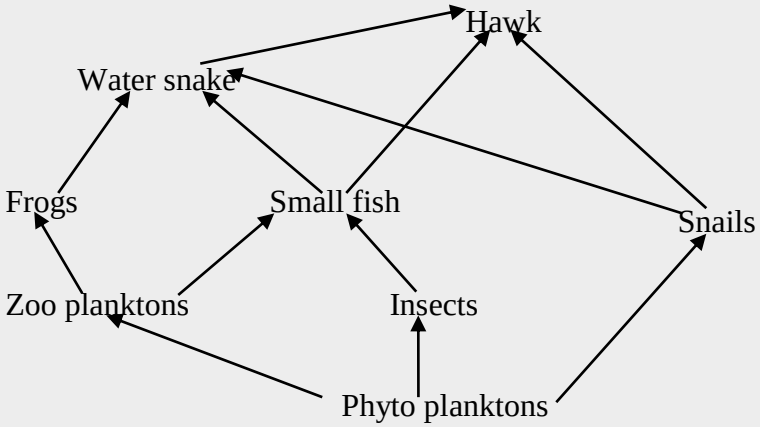
35. *(a) Explain how food as a factor regulates the population of animals in an ecosystem*

(b) Describe the flow of energy from the sun through the different trophic levels in an ecosystem

36. *(a) Describe how a population of grasshoppers in a given area can be estimated*

(b) Describe how the belt transect can be used in estimating the population of a shrub in a grassland

37. *The flow chart below represents a feeding relationship in an ecosystem*



(a) Name; (i) The producers in the ecosystem

(ii) Two organisms which are both secondary and tertiary consumers

(b) State two short term effects of immigration of insects in the ecosystem.

(c) Which organism has the least Biomass in the food web. Explain.

(d) State three disadvantages of using synthetic pesticides over Biological control.

(e) State the role of each of the following in an ecosystem;

(i) Saprophytes

(ii) Leguminous plants

(iii) Explain the role of producers in an ecosystem

(f) Name one method that would be used to estimate the population of small fish in the ecosystem

38. *How are leaves of mesophytes adapted to their functions?*

10. REPRODUCTION IN (A) PLANTS (B) ANIMALS

1. *a) Name the part of an ovule that develops into each of the following parts of a seed after fertilization*

i) Testa

ii) Endosperm

b) What is parthenocarpy?

2. *State three roles of placenta during pregnancy.*

3. *Name three main methods through which HIV/AIDS is transmitted*

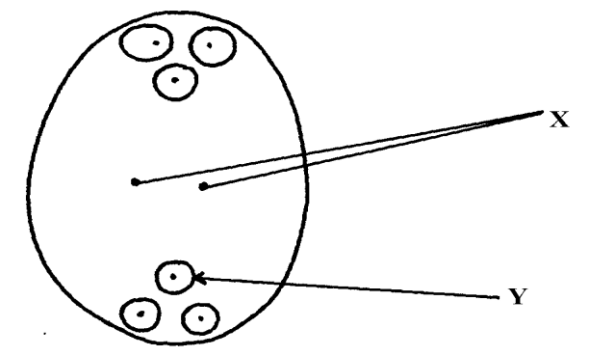
4. *(a) Name the processes that lead to fruit formation without fertilization*

(b) Name the hormone that causes leaf, flowers and fruit abscission

(c) What is the role of ecdysone hormone in insects

5. *State the roles of oviduct in female reproductive system*

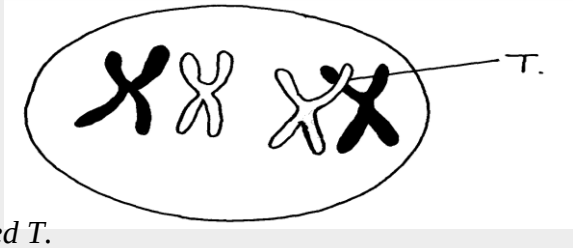
6. *The diagram below represents a mature embryo sac. Study it carefully and answer the questions that follow:*



(a) Identify structures X and Y

(b) Why is cross pollination more advantageous to a plant species than self pollination?

7. *The diagram below shows a phenomenon which occurs during cell division.*



(a) Name the part labeled T.

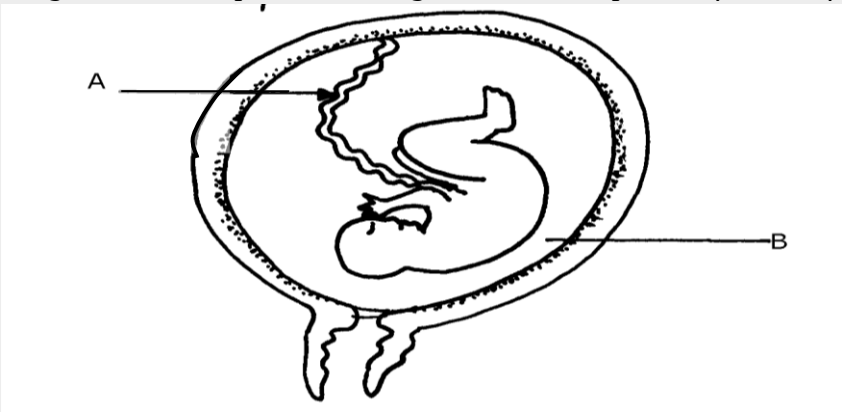
(b) (i) State the biological importance of the part labelled T.

(ii) Identify the type of cell division in which this phenomenon occurs.

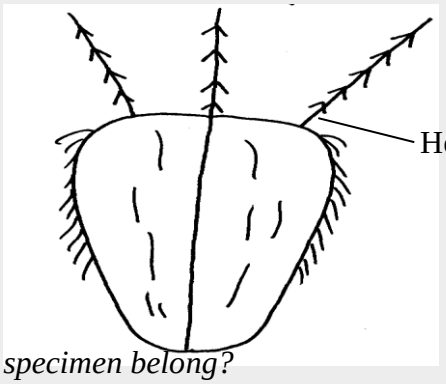
8. *(a) When are the two organisms considered to belong to the same species.*

(b) Explain the term alternation of generations.

9. *(a) Explain why Larmack's Theory of evolution is not accepted by biologists today.*
   (b) State the significance of mutation in evolution.
10. *(a) Give two roles of the placenta.*
    (b) Explain why hormone testosterone still exerts its influence even when vas deferens have been cut.
11. *Name two mechanisms that hinder self fertilization in flowering plants*
12. *State three ways in which plants compensate for lack of movement*
13. *(a) What do you understand by the term double fertilization?*
    (b) State two adaptations of animal dispersed fruits
14. *Name the hormone that;*
    (a) Stimulate the contraction of uterus during birth
    (b) Stimulates the disintegration of the corpus inteum when fertilization fails to take place
15. *State three ways in which flowers parent self pollination*
16. *The diagram below represents a stage in the development of human foetus*

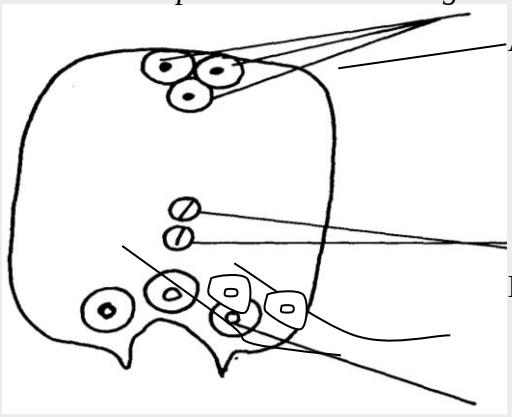


    (a) State one function of each of the structures labelled A and B
    (b) Apart from the size of the foetus what else from the diagram illustrates that birth was going to occur in the near future
    (c) Explain why a pregnant woman is supplied with doses of iron tablets regularly
17. *Name the type of placentation where;*
    (i) Placenta appears as one ridge on the ovary wall
    (ii) Placenta appears at the centre of the ovary with ovules on it and the dividing walls of carpels disappear
18. *The diagram below represents a mature fruit from a dicotyledonous plant, observe it and answer questions that follow*



    a) To what group of fruits does the specimen belong?
    b) Suggest the possible agent of dispersal of the fruit
19. *Explain why menstrual periods stop immediately after conception?*
20. *a) Why is sexual reproduction important in evolution of plants and animals*
    b) The calyx cells of a certain plant has 22 chromosomes. State the number of chromosomes present in the plant's
    i) Endosperm
    ii) Ovule cell

21. *The diagram below shows a pollen – tube entering the ovule of a flowering plant*



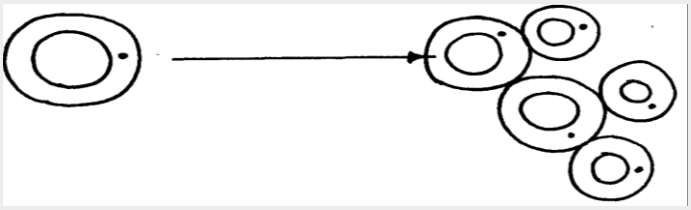
a) Name the parts labeled A, B and D
b) Name the kind of fertilization exhibited by the above flowering plant.

22. *Donkey and zebra are closely related yet not of the same species. Explain*

23. *Name two factors in the environment which organisms respond to*

24. *What is meant by the terms:-* *a) i) Epigynous flower*
ii) Staminate flower
b) Name the protective membranes surrounding the brain

25. *The diagram below illustrate a process in a given species of organism*



a) Name the organism that undergoes the process above
b) Identify the process shown to be taking place

26. *State two ways by which HIV/AIDS is transmitted from mother to child*

27. *(a) State the role of centrioles during cell division*

(b) (i) Explain the role of chlorophyll in photosynthesis
(ii) What is the main product of the dark stage of photosynthesis?

28. *(a) At what stage of meiosis is the chiasmata formed?*

(b) (i) What is the significance of the above part in living organisms?
(ii) State two importance of meiosis in living organisms?

29. *(a) State two ways in which the male parts of a wind pollinated flower are adapted to their mode of pollination*
(b) Differentiate between monoecious and dioecious plants

30. *(a) What is seed dormancy?*
(b) State two ways in which seed dormancy can be broken

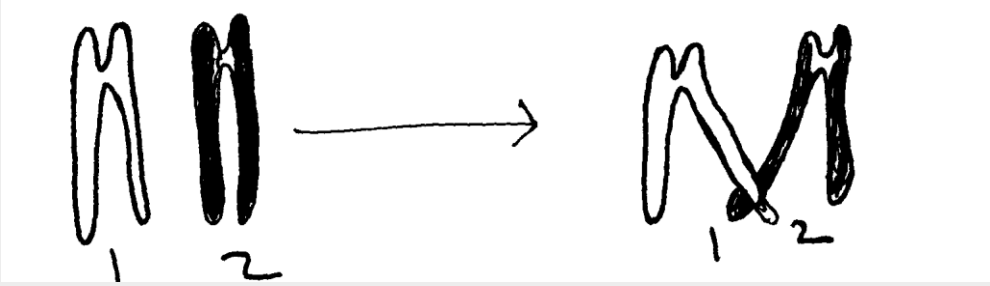
31. *(a) Explain two importance of the adult stage in metamorphosis in insects*
(b) What is the importance of the juvenile hormone in insects?

32. *Describe the possible effects of discharging hot effluent from a factory into a slow flowing river*

33. *State two disadvantages of external fertilization in animals*

34. *State three roles of placenta in mammals*

35. *(a) The diagram below shows a stage during cell division*



(i) Name the stage of cell division
(ii) Give a reason for your answer

(b) Name two structures in plants where male and female gametes are produced

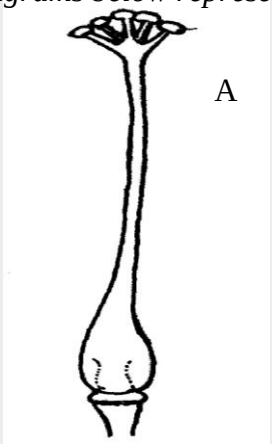
36. *State two advantages of metamorphosis to the life of insects*

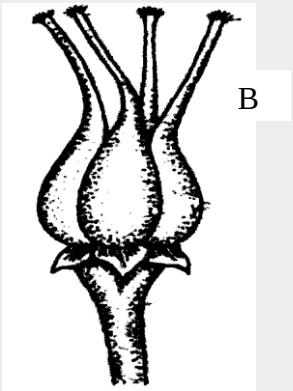
37. *List four differences between Mitosis and Meiosis*

38. *Give a reason why two species in an ecosystem cannot occupy the same niche*

39. *State the functions of the following hormones in the menstrual cycle :*
(i) oestrogen
(ii) luteinizing hormone (L.H)
(iii) Follicle stimulating hormone (FSH)

40. *The diagrams below represent two gynoecia A and B obtained from two different plants.*



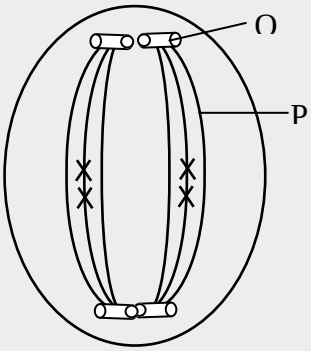


(a) What name is given to; Gynoecium A?
Gynoecium B?
(b) State the observable difference between the gnoecia A and B
(c) State the role played by Heterostyly in plants.

41. *State the difference between the sperm cell and the ovum.*

42. *(a) Name the parts of the flower in which pollen grains area formed.*
(b) Name two nuclei found in pollen grains.

43. *The diagram below represents a stage in cell division.*



(a) Name the stage of all division shown in the diagram above.
(b) Give reasons for your answer.

44. *Name the hormone that:*

(a) Stimulate the contraction of uterus during birth.
(b) Stimulate the disintegration of corpus luteum when fertilization fails to take place.

45. *State three ways in which seed dormancy benefits a plant*

46. *(i) State two major structural differences between fruit and a seed*
(ii) Why is it advisable to use biological control of pests?

47. *State the functions of the following parts in the male reproductive system*

(a) Somniferous tubules
(b) Sertoli cells

48. *(a) Name the parts of a flower responsible for gamete formation*
(b) State one feature of pollen grains from a wind pollinated flower

49. *Name the mechanisms that hinder self-fertilization in flowering plants*

50. *The eggs of birds are relatively much larger than those of mammals. Explain*

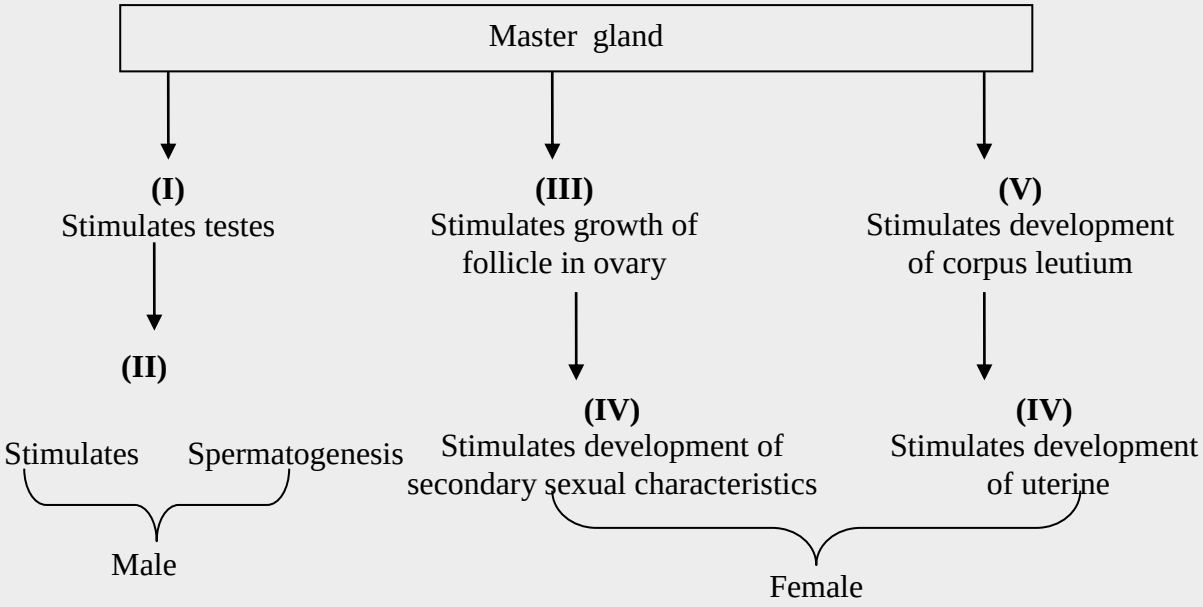
51. *Distinguish between the following terms:*

Pollination and fertilization

52. *a) Describe the various mechanisms of fruit and seed dispersal.*
b) Describe the varying events that follow a flower after fertilization.

53. *Describe how fruits and seeds are suited to their mode of dispersal*

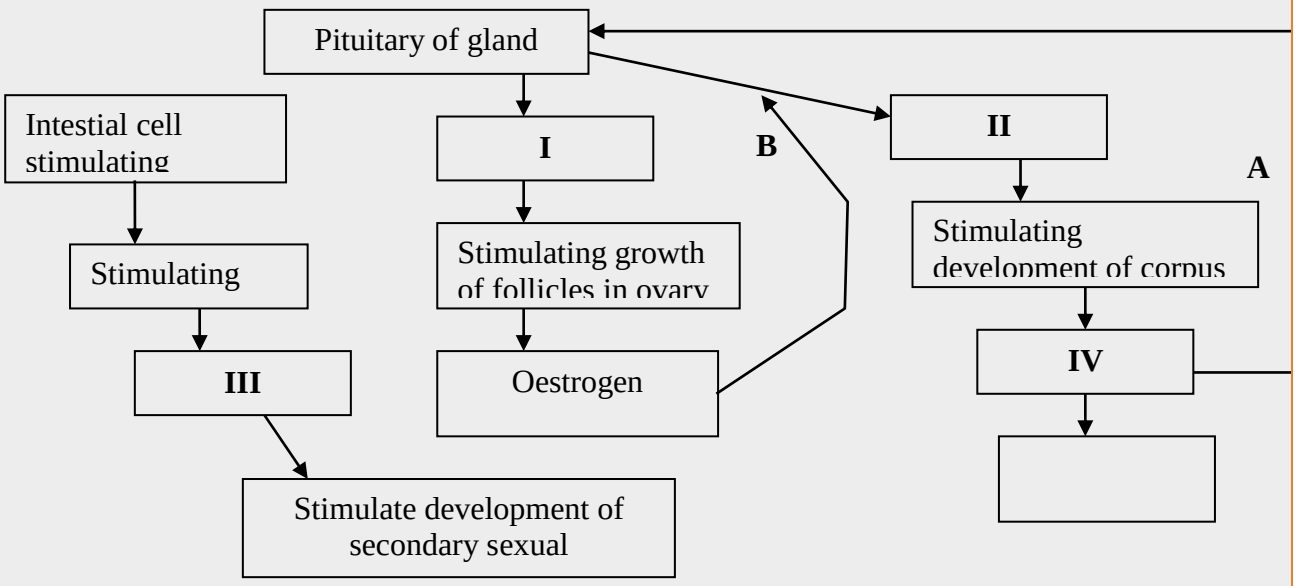
54. *The diagram below represents some hormones, their sources and functions in a mammal:*



(a) Identify the master gland described above

(b) Name hormones (ii), (iii), (v) and (iv)
(c) Explain the consequences of deficiencies of hormone (ii) in man
(d) Other than stimulating the development of uterine wall, suggest one other function of hormone (vi)

55. *The diagram below represents some hormones, their sources and functions in mammals.*

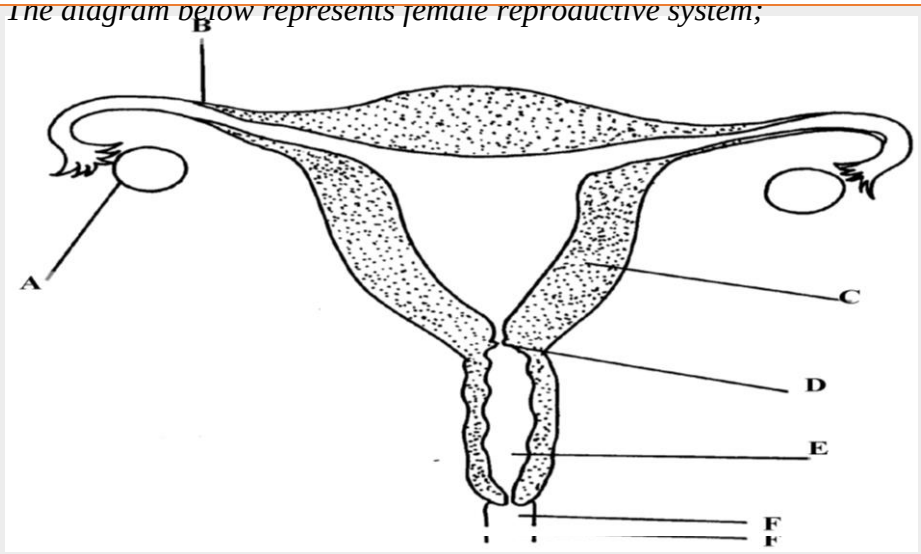


a) Name the hormones I, II and III
b) Name hormones IV and state its function
c) Name the control labelled A & B
d) Name one secondary sexual characteristic common to both males and females

56. *(a) State the role of spleen in human defense mechanism*
(b) State two ways by which the HIV spread may be controlled through patients in hospitals
(c) What do you understand by the word Acquired Immunity Deficiency Syndrome (AIDS)
(d) Why is immunization against diseases encouraged by the government
(e) State how natural active acquired immunity is attained by an individual

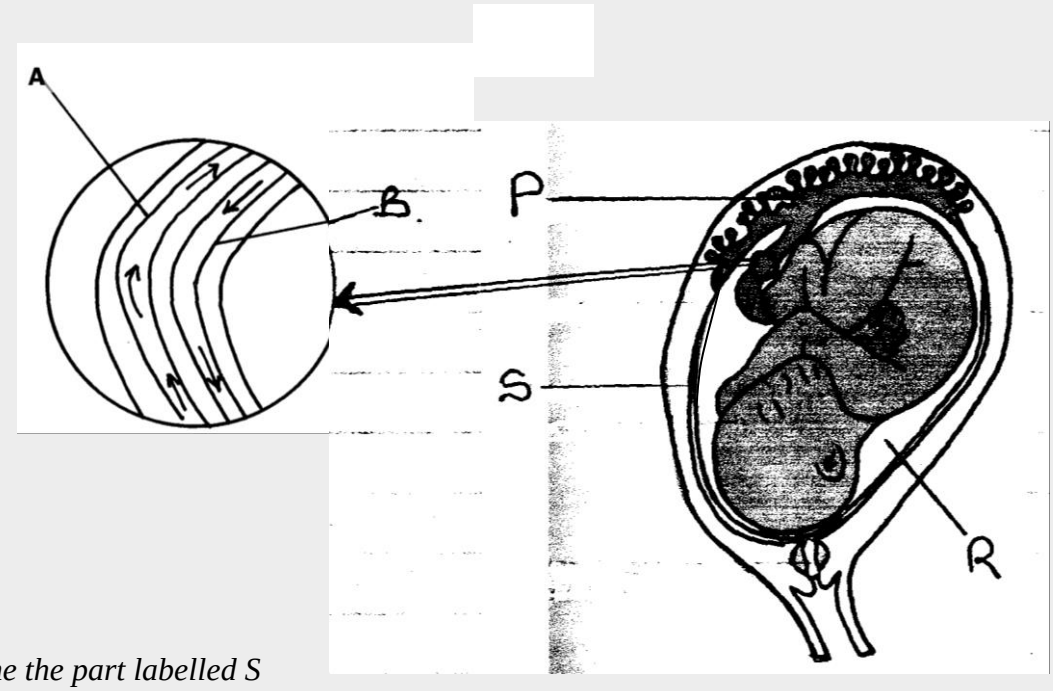
57. *Explain how seeds and fruits are adapted to the various methods of dispersal*

58. *The diagram below represents female reproductive system;*



a) Name the part labeled; A, B, C and D
b) State two functions of structure A
c) How is part C adapted to its function?
d) Of what significance is part E to reproduction?

59. *The diagram below represents a human foetus in a uterus*



(a) Name the part labelled S
(b) (i) Name the blood vessels labelled A and B
(ii) State the difference in composition of blood found in vessels A and B
(c) Name two features that enable the structure labelled P carry out its function
(d) State the role of the part labelled R

60. *An experiment was carried out to investigate the rate of growth of pollen tube against time.*

The results are shown in the table below:

Time in minutes	*Growth of pollen tube in millimeters*
0	*0*
30	*4.0*

60	9.8
90	15.2
120	20.0
150	21.6
180	22.4

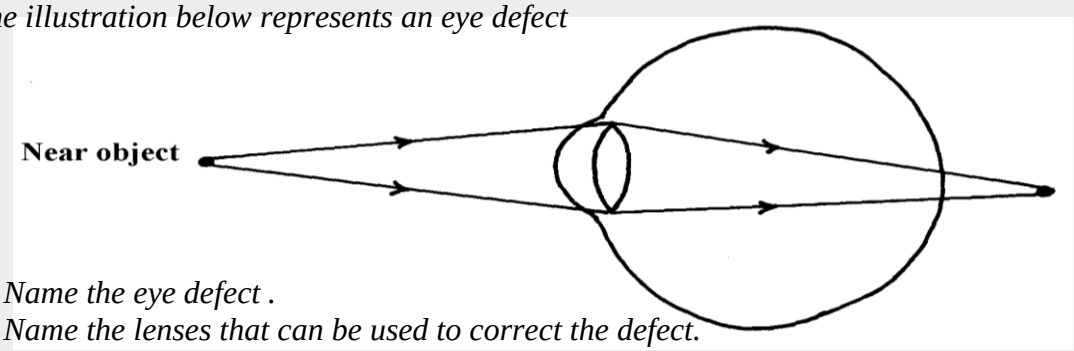
(a) (i) On the grid provided draw a graph of the pollen tube growth against time.
(b) (i) At what intervals was the growth of the pollen tube measured?
(ii) What was the length of pollen tube at; 130 minutes
(iii) At what time was the length of the pollen tube 18mm?
(iv) With reasons, describe the growth pattern of the pollen tube between:

- *0 to 120minutes*
- *Reason*
- *120 to 180 minutes*
- *Reason*

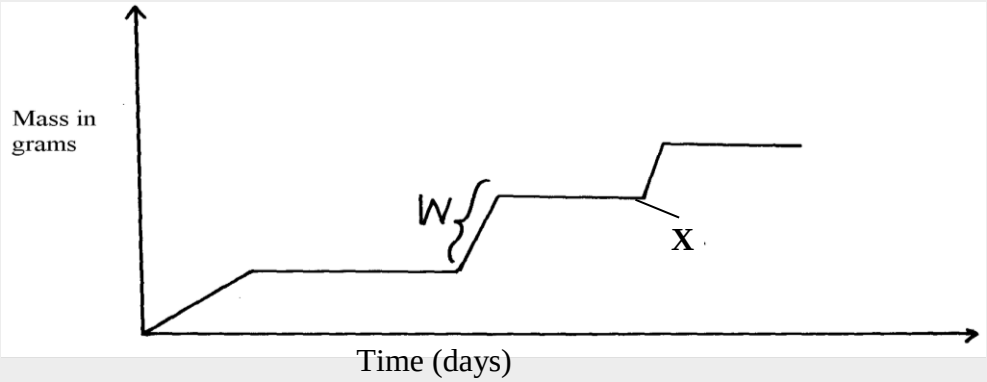
(v) State the importance of the growth of pollen tube to the plant
(c) State the changes that take place in a flower after fertilization

11. GROWTH AND DEVELOPMENT IN (A) PLANTS (B) ANIMALS

1. *a) Name the hormone which controls moulting in insects.*
   b) State the importance of moultng in insects.
2. *The illustration below represents an eye defect*

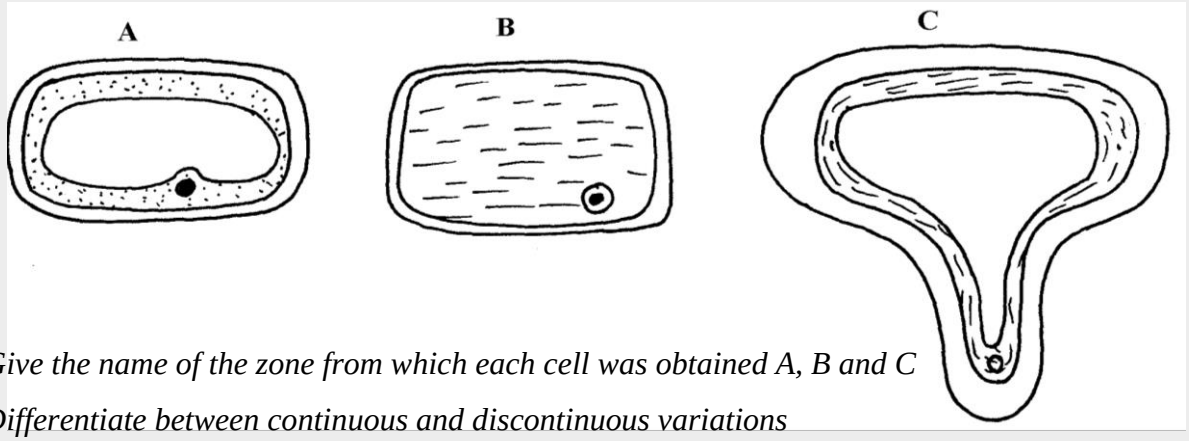


   a) Name the eye defect .
   b) Name the lenses that can be used to correct the defect.
3. *(a) State two functions of the kidney*
   (b) Name two substances that are not found in urine of a healthy person
   (c) Name two diseases that affect the kidney
4. *The diagram below represents a growth pattern of arthropods.*



   (a) Name the type of growth pattern represented on the graph.
   (b)Identify the process represented by X.
   (c) Which hormone is responsible for process at X in 15 (b) above?
5. *Distinguish between natural and acquired immunity.*

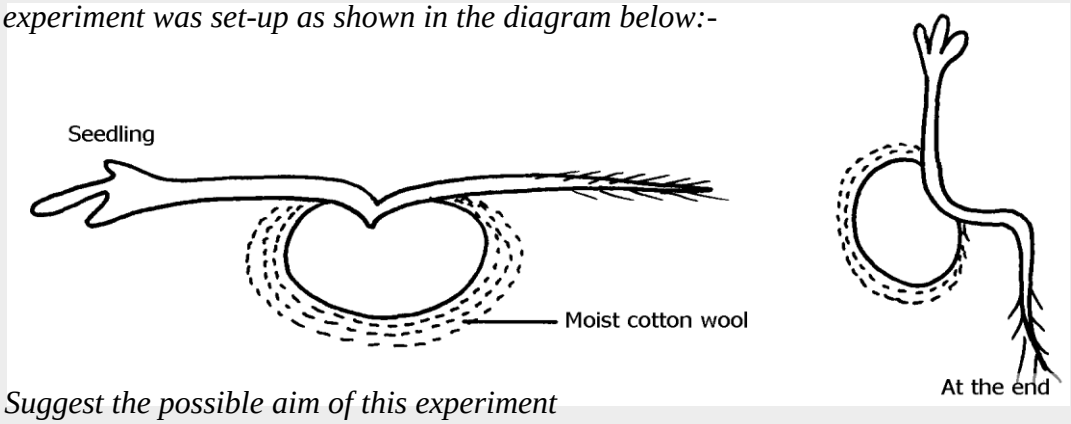
6. *The cells shown below were obtained from different parts of a young root tip:*



Give the name of the zone from which each cell was obtained A, B and C

7. *Differentiate between continuous and discontinuous variations*

8. *An experiment was set-up as shown in the diagram below:-*



(a) Suggest the possible aim of this experiment
(b) Account for the observation at the end of the experiment

9. *State the location of each of the following plant meristematic tissues:-*

(i) Vascular cambium
(ii) Intercalary meristem

10. *Define the following terms: a) Growth*
b) Development

11. *State two advantages of metamorphosis in the life insects*

12. *State one disadvantage of exoskeleton in insects.*

13. *Distinguish between primary growth and secondary growth in a flowering plant*

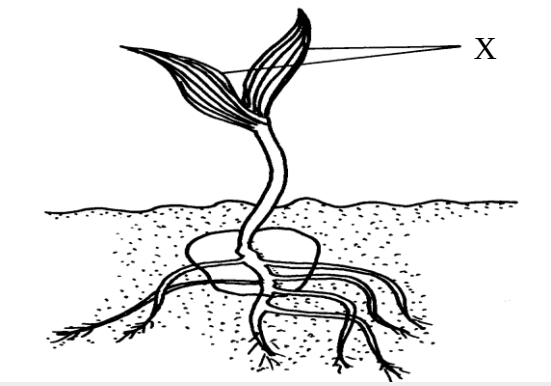
14. *What is the role of the following to a germinating seed: (i) Oxygen*
(ii) Cotyledons

15. *Give three applications of plant growth hormones in agriculture*

16. *State two functions of calcium in the human body*

17. *State the biological importance of ecdysis in arthropods*

18. *The diagram below represents a stage during the process of germination.*

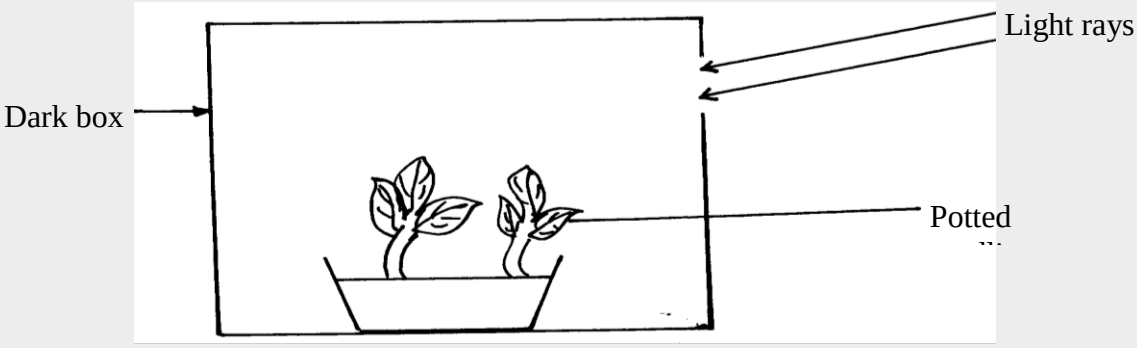


(a) (i) Name the type of germination illustrated in the diagram

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

(b) Give two functions of the part labelled X

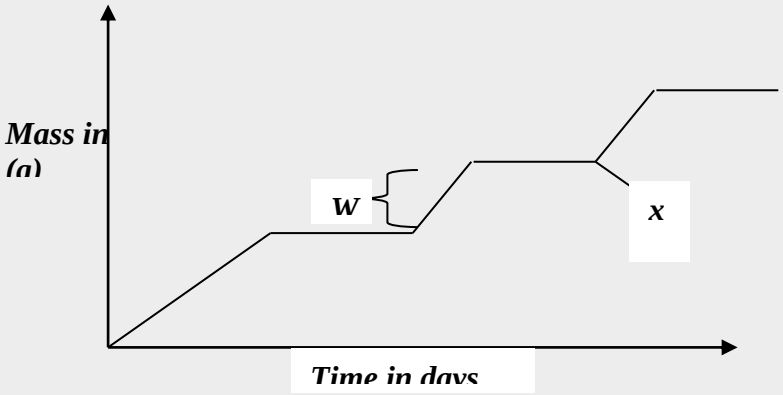
19. *In an experiment young potted seedlings were placed in a dark box with unilateral light source as shown below:*



(a) What was the aim of the experiment?

(b) State the observations made on the seedlings after 3 days

20. *The graph below represents the growth of animals in a certain phylum.*



(a) Name the type of growth pattern shown on the graph.

(b) Identify the process represents by x.

(c) Name the hormone responsible for the process in B above.

21. *(a) State the role of the vascular cambium in plant growth and development.*

(b) Explain why monocotyledons plants do not undergo secondary thickening.

22. *Explain how placenta is adapted to its functions*

23. *State the role of the following during germination:*

(a) oxygen

(b) enzyme

24. *Name the type of responses exhibited by:-*

(a) (i) Marine crabs burrowing into the sand to avoid dilution of their body fluids

(ii) Chlamy domonas plant moving towards a region of high light intensity

(b) (i)What type of neuron is drawn above?

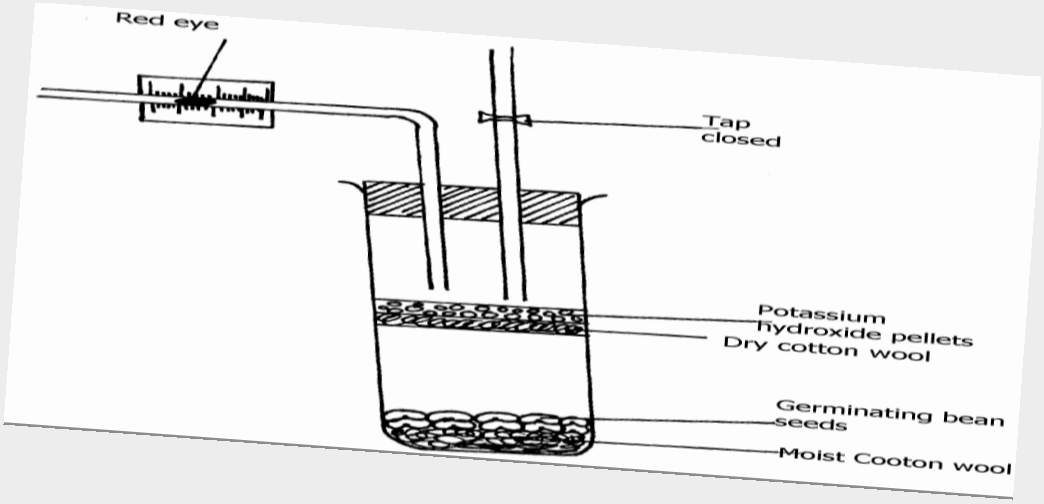
(ii) Using an arrow, show the direction of the nerve impulse

(iii) Name the part labelled X

(iv) State the function of part labelled Y .

(c) Give two differences between reflex action and conditioned reflex action

25. *The experiment set – up below was designed to investigate an aspect of germination.*



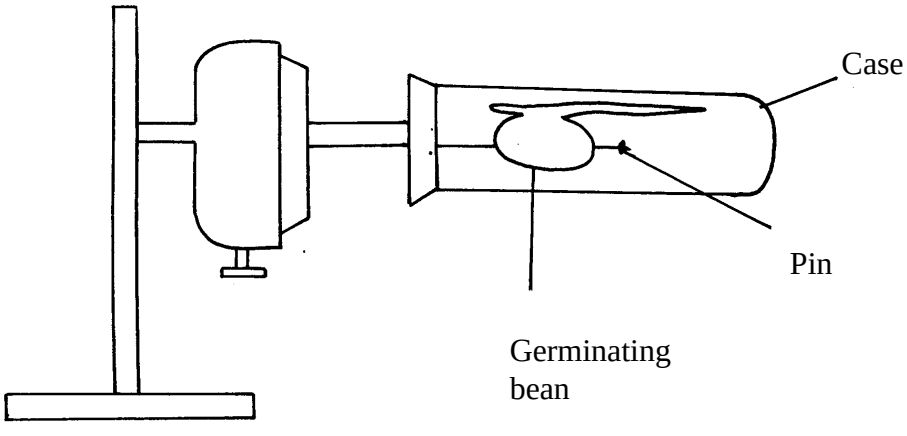
a) Why was potassium hydroxide pellets used in this experiment?
b) What was the role of moist cotton wool in this experiment?
c) i) By means of an arrow, indicate on the diagram the direction in which red dye would move during the experiment.
ii) Give reason for your answer in c(i) above.
d) Other than the factor investigated above, state any other one factor necessary for germination process.

26. *The following data represents the development in dry mass of germinating seedlings within 18 weeks:*

Time in weeks	*0*	*1*	*2*	*4*	*6*	*10*	*13*	*15*	*16*	*18*
Dry mass in grammes	*0.1*	*2*	*3.2*	*10*	*18*	*32*	*44*	*45*	*44*	*38*

(a) Using suitable scales plot a graph of dry mass against time
(b) Write reference to the graph, explain the changes in dry mass between:-
(i) Week 0 to 2
(ii) Week 5 to 13
(iii) Week 16 - 18
(c) (i) What is the significance of time zero?
(ii) What difference would be expected from the above results if the experiment started with the seeds? Give a reason for your answer
(d) (i) Describe how you carry out the experiment to obtain dry mass in the respective weeks
(ii) State one advantage of using dry mass instead of fresh weight in estimating growth of an organism

27. *The diagram below represents a set-up that was used to investigate the effect of rotation on the growth of a bean radicle. The set-up allowed the seedling to rotate slowly and continuously for seven days*



(a) Name the piece of apparatus illustrated
(b) (i) State the observation made on the shape of the radicle after seven days
(ii) Explain the observation in (b) (i) above
(c) Suggest a suitable control for this experiment
(d) Give any four importance of tropism in plants

28. *An experiment was carried out to determine the growth rates of variety of bamboo and a variety of maize in two adjacent plots. The average height and average dry weight of plants from the two populations were determined over a period of twenty weeks. The data is as shown below:-*

a) On the same axes, plot a graph to show the changes in average weight of the bamboo and maize plants over time
(b) (i) Which of the two plants had a higher productivity by the end of the experiment?
(ii) Give a reason for your answer in (b)(i) above
(c) Explain the following:
(i) Between weeks 14 and 18 the average height of maize plants remained constant while the average dry weight increased
(ii) Dry weight was used instead of fresh weight in this experiment
(iii) Describe how the average height and average dry weight of plants were determined in this experiment;
(d) Why was it appropriate in this experiment to use both weight and height?
(e) Give a reason why secondary thickening does not occur in bamboo and maize plants

29. *(a) What is meant by the term fertilization ?*
(b) (i) Name the type of cell division that produces gametes
(ii) Where does the type of cell division mentioned above occur in mammals?
(c) What happens to the wall of the uterus;
(i) before the release of an egg ?
(ii) if no fertilization occurs?
(b) How is the placenta adapted to its functions?

30. *The relationship between seed fresh mass in the lupin <u>lupinus</u> and percentage seed germination, percentage seedling survival and seedling fresh mass is shown in the table;*

Seed fresh Mass mg^{-1}	*Percentage germination*	*Percentage of seedlings surviving 2 leaf stage*	*Mean seedling fresh mass 5 weeks after germination/mg*
Below 16	*41.9*	*84.6*	*24.3*
17-25	*90.2*	*96.8*	*44.2*
26-35	*95.6*	*98.8*	*60.7*
36-45	*97.5*	*100.0*	*86.4*
Above 45	*100.0*	*100.0*	*106.4*

a) How was percentage germination in column two of the table calculated?

b) Why was seed fresh mass preferred to seed dry mass to take measurements of the seed weight in the experiment

c) i) Explain why the measurements of mean seedling fresh mass (5) weeks after germinated may not have been an accurate measurement of growth that had occurred

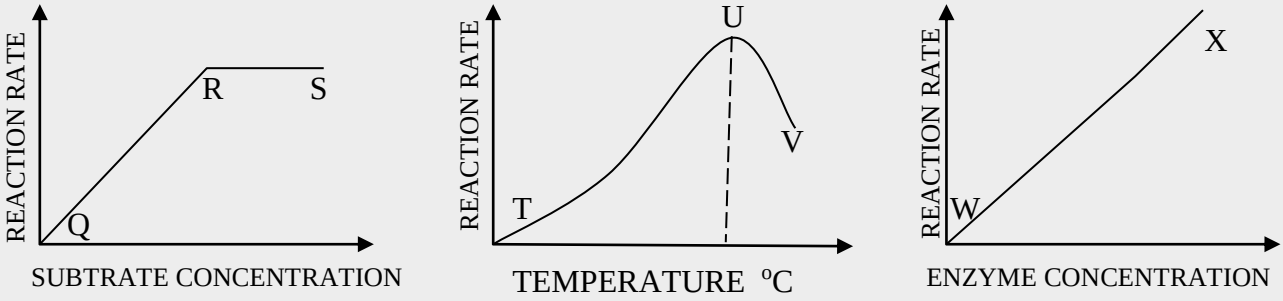
ii) How could more meaningful and accurate measurement been obtained in c(i) above?

d) With reference to the figures in the taste indicate the relationship between seed fresh mass and percentage seed germination, percentage seedling survival and seedling fresh mass

e) Suggest an explanation why seedling produced from large seeds grow more rapidly than the

seedling produced from small seeds

31. *The diagram below illustrate enzyme controlled reaction*



a) State the relationship between rate of reaction and enzyme concentration

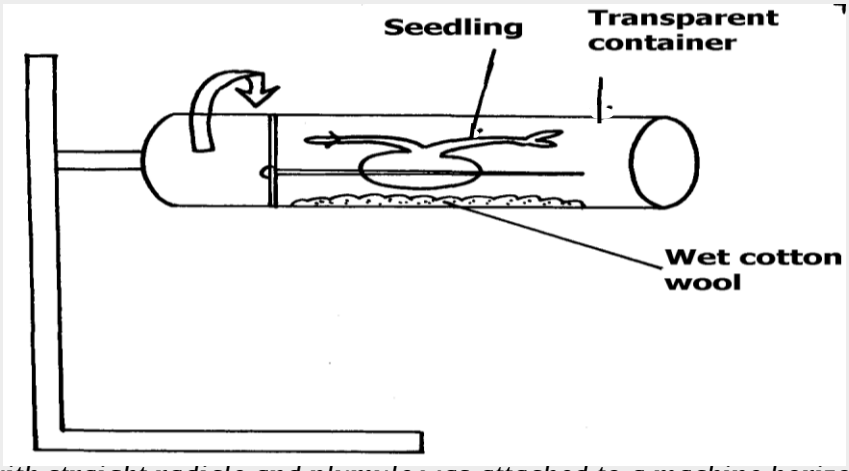
b) Account for the rate of reactions between; i) Q and R

ii) R and S

iii) U and V

c) Name one other factor that affects enzyme action, not illustrated above

32. *Carefully study the figure below and answer the questions that follow:-*



The seedling with straight radicle and plumule was attached to a machine horizontally as shown above. The machine rotates making one revolution in 15minutes.

(a) Draw how the seedling would look like after one week

(b) Explain your drawing in (a) above

(c) Name the machine used in the experiment above

(d) What would happen if the seedling was put horizontally outside the machine

(e) Name the stimuli investigated and type(s) of response expected in the experiment

33. *(a) Give the form in which each of the following substances ate transport in mammalian blood:*

(i) Carbon (IV) oxide

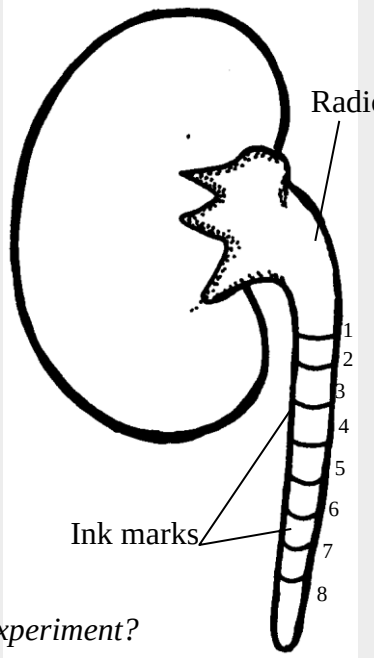
(ii) Oxygen

(b) Give two functions of pleural membrane

(c) Explain why formation of carboxyhaemoglobin in the blood of a mammal results in death

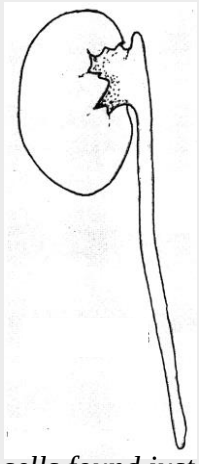
(d) Other than stomata, name two other gaseous exchange surfaces in plants

34. *In an experiment the radicle of a seedling was marked equidistant using Indian ink as shown in the diagram below:*



(a) What was the aim of the experiment?

(b) On the diagram below mark on the radicle to show the appearance of the marks after 3days



(c) State three characteristics of cells found just behind the root cap of a radicle

(d) Give two factors inside a seed that causes seed dormancy

12. GENETICS

1. *A woman with blood group A gave birth to twins both having blood group AB.*

Determine the genotype of:

a) Father

b) Mother

2. *50 black mice and 50 white mice were released into an area inhabited by a pair of owls. After four*

months, the mice in the area were recaptured and only 38 of the black mice and 9 of the white mice were remaining.

a) How would this observation be explained ?

b) Name the theory of evolution that supports the results in (a) above.

3. *State three mechanisms that prevent self pollination in a flower that has both male and female Parts.*

4. *(a) Distinguish between complete and incomplete dominance*
   (b) State two sources of variation

5. *Part of one strand of a DNA molecule was found to have the following base sequence.*

   G – T – C – A – G – T

   (a) What is the sequence on m-RNA strand copied from this DNA portion?
   (b) State two roles of DNA molecule.

6. *State three ways by which plants compensate for lack of ability to move from one place to another.*

7. *A student mixed a sample of urine from a person with Benedict's solution and heated, the colour changed to orange.*
   (a) What was present in the urine sample?
   (b) What did the student conclude on the health status of the person?
   (c) Which organ in the person may not be functioning properly?

8. *Differentiate between continuous and discontinuous variations*

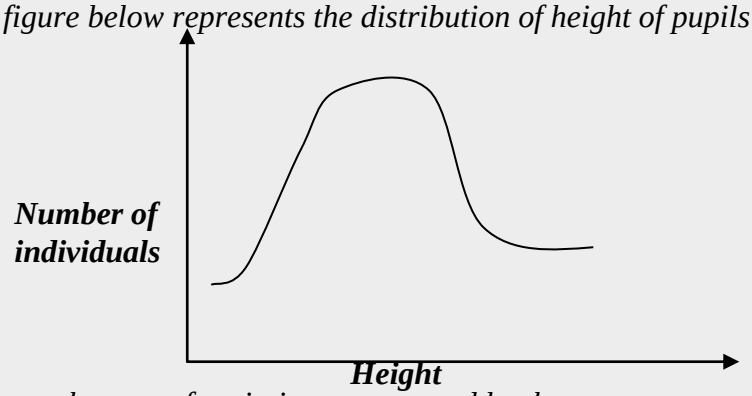
9. *Members of the same species of organism tend to differ due to variation. State three causes of variation in organisms*

10. *Identify the type of gene mutations represented by the following pairs of words:-*

    (i) Shirt instead of skirt
    (ii) Hopping instead of shopping
    (iii) Eat instead of tea

11. *A DNA stand has the following base sequence: GCCTAGATCAC*
    What is the sequence of the : (i) Complementary DNA strand?
    (ii) M-RNA strand coped form this DNA strand

12. *The figure below represents the distribution of height of pupils in a school*



    (a) Name the type of variation represented by the curve
    (b) Outline two possible causes of variation in height of individuals in man

13. *a) Wekesa and Wanjiku who are siblings are both normal as their parents but have a hemophilic brother. Give the Genotype of their parents.*
    b) i)What are linked genes?
    ii) What do you understand by the phase a test cross?

14. *There are at least 205 known sex – linked recessive disorder*
    a) Name any two of them.
    b) State a reason why sex – linked recessive why traits tend to effect the male child.
    c) State why if a mother has the trait all her sons will have it

15. *The table below is a representation of a chromatide with genes along its length. It undergoes*

mutation to appear as shown below:

Before mutation	*L*	*M*	*N*	*O*	*P*	*Q*
After mutation	*L*	*O*	*N*	*M*	*P*	*Q*

a) Name the type of chromosomal mutation represented

b) Name one mutagenic agent

16. *The figure below is a structural diagram of a portion from a nucleic acid strand*

a) Giving a reason, name the nucleic acid to which the portion belongs
b) Write down the sequence of bases of a complementary DNA strand

17. *In an experiment, plants with red flowers was crossed with plants with white flowers.*

All the plants in the F_1 generation had pink flowers.

a) Give a reason for the appearance of pink flowers in the F_1 generation
b) If plants in F_1 were selfed, state the phenotypic ratio of the F_2 generation
c) Explain; i) Why women should drink extra milk during pregnancy
ii) A pregnant women might want to urinate more often in late pregnancy

18. *State the meaning of the following terms giving an example in each case:*

(a) Sex-linked genes
(b) Multiple alleles

19. *In a certain breeding experiment, a plant species with red flowers was selfed. It produced 119 red flowered and 41 white flowered offsprings.*

(a) Using letter R to represent allele for the red flowers, state the genotype of the red flowered parent plant
(b) Determine the phenotypic ratio of red and white flowered plants. Show your working

20. *Give an example of a sex-linked trait in human on:*
(i) Y – Chromosome
(ii) X – Chromosome

21. *Explain why growth of long hair on the pinnae of the ears in human occurs in males only*

22. *Explain why prophase 1 of meiosis contributes towards genetic variation in living organisms.*

23. *A pure Red flowered plant was crossed with a pure white flowered plant. All the F_1 generation plants had pink flowers.*

(a) Give an explanation for the absence of Red and white flowered plants in the F_1 generation.
(b) If the F_1 generation pea plants were selfed, state the phenotypic ratio of the F_2 generation plants.

24. *(a) Name a genetic disorder due to gene mutation that affects the malpighian layer of the skin in man.*
(b) Give two functions of the fluid produced by sebaceous glands.

25. *(a) Define the term "Gene mutation."*
(b) Name the genetic disorders that result from gene mutation in human beings.

26. *(i) What are mutations*
(ii) Name two mutagens

27. *A section of a DNA strand contains the following sequence CGGATAC*

(a) Write the; (i) Complementary DNA strand
(ii) MRNA strand
(b) Name the site for protein synthesis in a cell

28. *In a certain bird species, red flight feathers is controlled by gene R while white flight feathers is controlled by gene r. The heterozygous condition Rr results into pink flight feathers. The two genes are also sex linked and transmitted on x-chromosome.*

a) By use of fusion lines, find the genotypes of across between a male with pink flight feathers and a female with white flight feathers

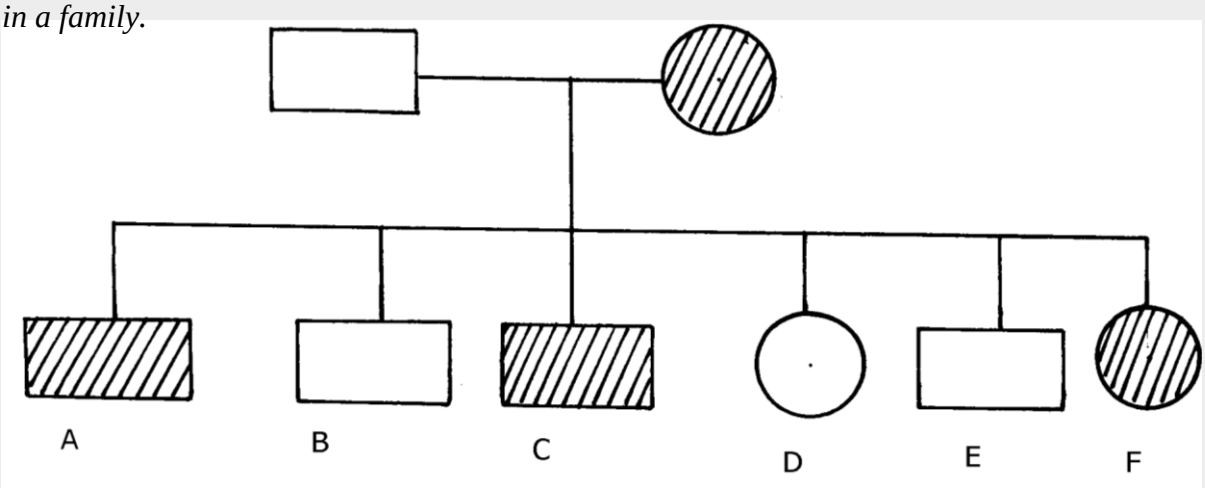
b) Which type of dominance is illustrated here?

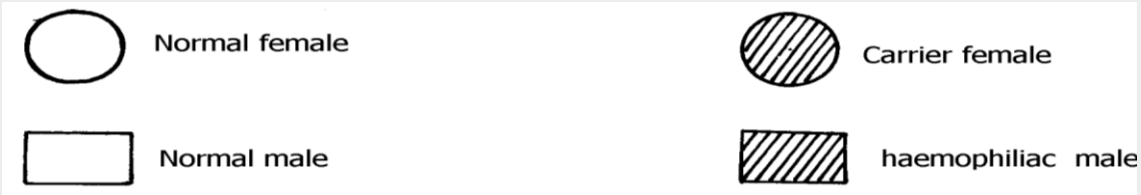
c) i)Identify the nucleic acid whose base sequence is shown below:
G-A-C-U-A-G-A-C-G

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

iii) If the nucleic acid was involved in protein synthesis, how many amino acids would be present in the protein synthesized? Give a reason

29. *Study the genetic chart below showing the inheritance of the gene responsible for haemophilia in a family.*



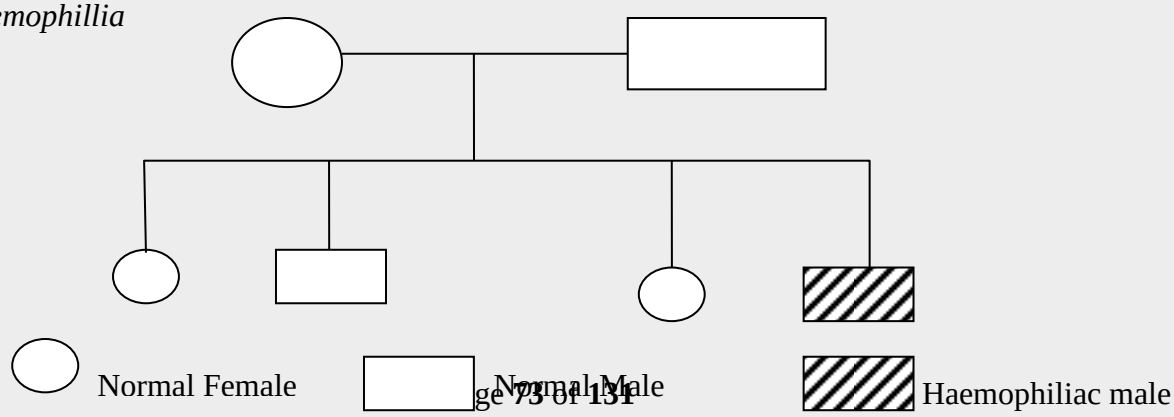


a) Write the genotype of individuals A, B, F

b) A member of this family labelled F marries a haemophiliac male. What will be the phenotypic ratio of the offspring? Show your workings

c) Other than the condition stated above, state any other two common genetic disorders that result from gene mutation.

30. *Haemophilia is due to a recessive gene. The gene is sex-linked and located on X chromosome. The chart below represents the offspring of parents who are phenotypically normal for haemophillia*



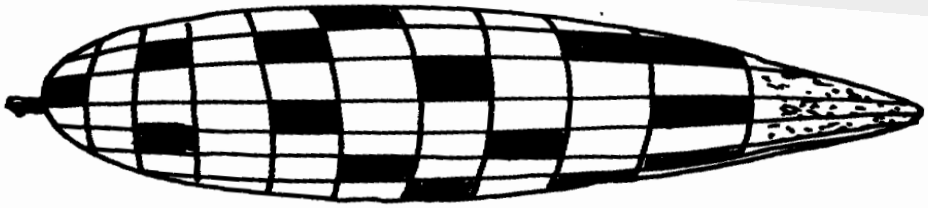
(i) What are the parental genotypes?
Explain your answer in (i) above
(ii) Work out the genotypes of the offspring

31. *A cross between a red-flowered and a white flowered plant produced only pink –flowered F_1 plants*

(a) There was neither a red nor white –flowered F_1 plants. Explain
(b) The F_1 offspring were selfed to get F_2 generation. Using appropriate letter symbols, work out the genotypes of F_2 generation
(c) Give the genotypic and phenotypic ratios of F_2 generation
(d) Distinguish between dominant and recessive genes

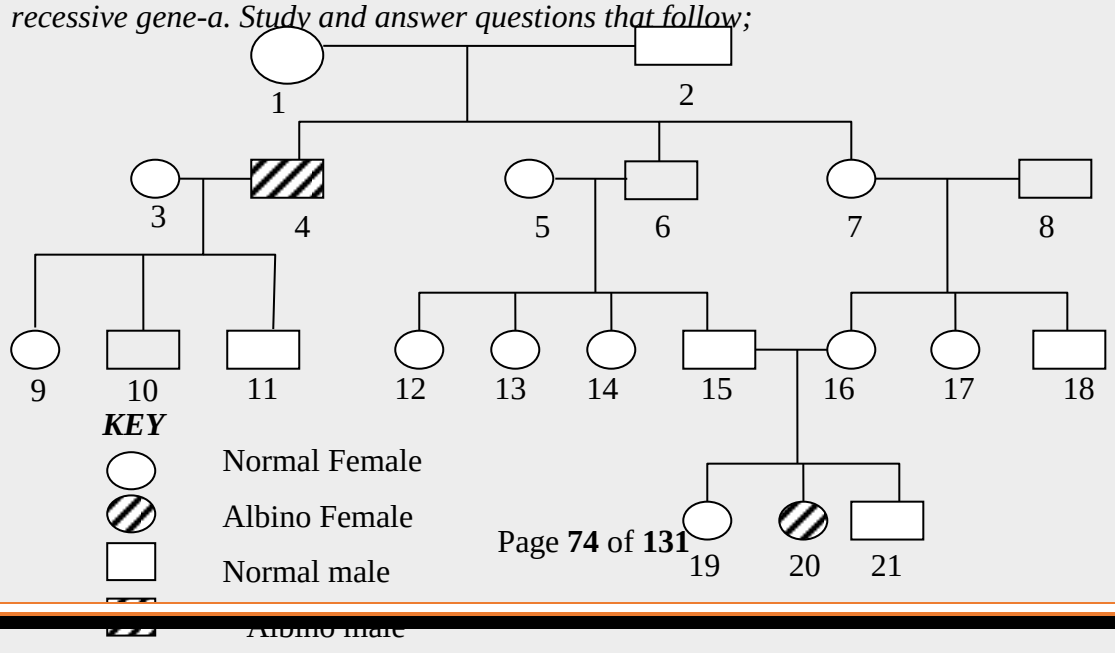
32. *A true-breeding purple maize variety was cross-pollinated with a true-breeding yellow maize variety.*

The offspring produced all purple fruits.
The plants grown from these F_1 grains were interbred among each other.
A typical cob of F_2 generation is shown below:
The yellow fruits are shaded while the purple ones are un-shaded.



(a) (i) In terms of flowers only, state why it is easier to work out genetic crossings using maize
(ii) Count separately the yellow and purple grains and therefore find the rations of purple grains to yellow grains
(b) Using appropriate symbol, work out a genetic cross for F_2 generation
(c) From the above information, give the dominant gene
(d) State two practical applications of genetics in identity determination

33. *The figure below is a pedigree chart showing incidence of albinism which is transmitted through a recessive gene-a. Study and answer questions that follow;*



(a) Write down the genotype of persons 1 and 2. Give a reason for your answer
(b) Giving your reason state the most likely genotype of person 3
(c) The cross between person 15 and 16 represents mating between first cousins. Comment why it is not advisable for close relatives to marry
(d) Apart from albinism name two other effects of gene mutation

34. *The table below shows results of test to determine blood groups of persons Y and Z.A tick (√) Represents, agglutination while a cross (x) represents no agglutination;*

Person	*Test with antibody (a)*	*Test with antibody (b)*	*Test with Rhesus antibody*	*Blood group*
Y- (male)	√	*X*	√	
X- (female)	*X*	√	*X*	

(a) Fill the blank space in table to show the blood group of the persons Y and Z
(b) In order to investigate the inheritance of Rhesus factor, work out a cross between a male with Rh^+ and female with Rh^- .Let D represent the presence of Rhesus factor and d to represent the absence of the Rhesus factor
(c) Determine the genotype of the cross in (b) above.
(d)Which of the children can donate blood to their mother?

35. *Describe the behavioural adaptations of animals to temperature*

36. *In man blood group inheritance is controlled by multiple alleles in which allele A is co dominant to allele B. a woman laterozygous for blood group A married a man heterozygous for blood group B*

a) State the genotype of both parents
b) Using a pun net square, show the genotypes of F_1 generation
c) State one application of knowledge of blood group inheritance in man
d) The nitrogenous bases in nucleic acids are Adenine (A), cytosine(C), Guanine (G), Thiamine (T) and uracil (U). Input of a molecule of DNA the sequence of bases is CTT. Using the letters A, C, G, T, U where appropriate, write down the base sequence in;
i) Corresponding part of the complementary strand of DNA molecules
ii) Corresponding part in mRNA
iii) A change in the DNA molecules caused the base sequence in the triplets to change from CTT to CAT. State one factor which could have caused the change

37. *In an investigation plants with red flowers were crossed with plants with white flowers. All the plants in the F_1 generation had pink flowers when the F_1 plants were crossed, he counted 480 plants in F_2 generation*

(a) Using appropriate letter symbols, work out the cross between the F_1 plants to get the F_2 generation
(b) Give the phenotypic and genotypic ratios for the F_2 generation
Phenotypic ratio
Genotypic ratio

(c) How many plants in the F_2 generation had pink flowers? (show your work)

38. *In an experiment, a black mouse was mated with a brown mouse. All the off springs in F_1 generation were black. The off springs grew and were 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)
(b) State the following for the F_2 generation
(i) Genotypic ratio
(ii) Phenotypic ratio
(iii) The total number of brown mice

39. *(a) Distinguish between Homologous structures and analogous structures. Give an example in each case.*
Homologous structures
Example
Analogous structures
Example
(b) Explain why parasites develop resistance to certain drugs after a long time of exposure.
(c) (i) What is non— disjunction?
(ii) Give one example of a genetic disorder associated with non-disjunction .

13. EVOLUTION

1. *a) Distinguish between homologous and analogous structures in evolution.*
b) Name one vestigial structure in mammals.
2. *a) Give two examples of adaptive radiation in animals.*
b) State two disadvantages of using fossils as evidence of evolution
3. *Distinguish between camouflage and mimicry.*
4. *State the role of light in photosynthesis*
5. *(a) Name the region of the gut where digestion of cellulose takes place.*
(b) State role of cardiac sphincter in the stomach.
6. *(a) Give two limitations of fossil records as evidence of evolution*
(b) State any two similarities in structure between Homo erectus and Homo Sapiens
7. *(a) (i) What is meant by vestigial structures?*
(ii) Give an example of a vestigial structure in human
8. *Distinguish between the struggle for existence and survival for the fittest as used in the theory of natural selection*
9. *Give two factors that determine water reabsorption in the distal convulated tubule*
10. *Distinguish divergent and convergent evolution*
11. *(a) What are the advantages of natural selection*
(b) All insects are believed to have arisen from a common ancestor. However, modern insects differ widely in a variety of ways such as in the adaptation of their mouthparts for different modes of feeding. What kind of evolution is this?
12. *Explain why Lamacks theory of evolution is not accepted by Biologists today.*
13. *a) i) What is meant by vestigal structures*
ii) Give an example of vestigal structure in human

b) Explain why certain drugs become ineffective in curing a disease after many years of use

14. *(a) What is organic evolution?*
(b) Briefly explain the term "survival for the fittest" as used in Darwin's theory of natural selection
15. *Explain why insecticides become ineffective against insects if used for several years in succession*
16. *State three limitations of fossils records as an evidence of organic evolution*
17. *State three pieces of evidence that support the theory of organic evolution*
18. *What is meant by natural selection?*
19. *(a) Explain why Lamarcks theory of evolution is not accepted today*
(b) State two limitations of fossils records as evidence of organic evolution
20. *In a breeding experiment, plants with red flowers were crossed. They produced 123 plants with red flowers and 41 with white flowers:*
(a) Identify the recessive trait
(b) Give a reason for your answer
(c) If white flowered plants were selfed, what would be the genotype of their offspring? Show your working using appropriate symbols (R, r)
(d) What is a test cross?
21. *a) What is organic evolution?*
b) Describe the various evidences which support the theory of organic evolution.
22. *(a) What is meant by the term natural selection*
(b) Describe how natural selection brings about the adaptations of a species to its environment
(c) Distinguish between convergent and divergent evolution
(d) Discuss four evidences to show that evolution has taken place
23. *Explain the various evidence for organic evolution*
24. *(a) What is organic evolution*
(b) Explain why resistance to antibiotics is considered as an example of evolution
(c) List and explain various evidences of organic evolution
25. *Pure breed red flowered plants were cross pollinated with pure breed white flowered plants.*
The resulting F_1 offspring's had pink flowers.
(a) Using letter R to represent the gene for red colour and letter W to represent gene for white colour of flowers. Work out the genotype of the F_1 generation
(b) If seeds from the F_1 generation plants were planted and allowed to self pollinate. Work out the phenotypic ratio of the F_2 generation

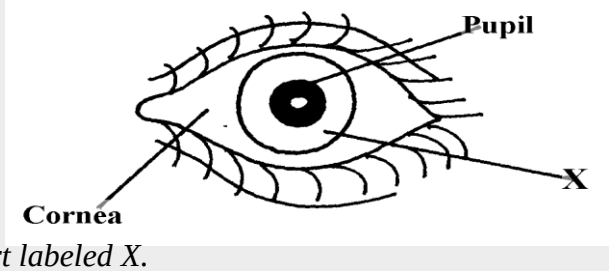
14. IRRITABILITY AND SENSITIVITY IN (A) PLANTS (B) ANIMALS

1. *Give two functions of the exoskeleton in arthropods.*

2. *When shoots of young plants are exposed to unidirectional light they bend towards light;*

   a) Name the type of response exhibited by the young shoots
   b) Explain the cause of the observation above

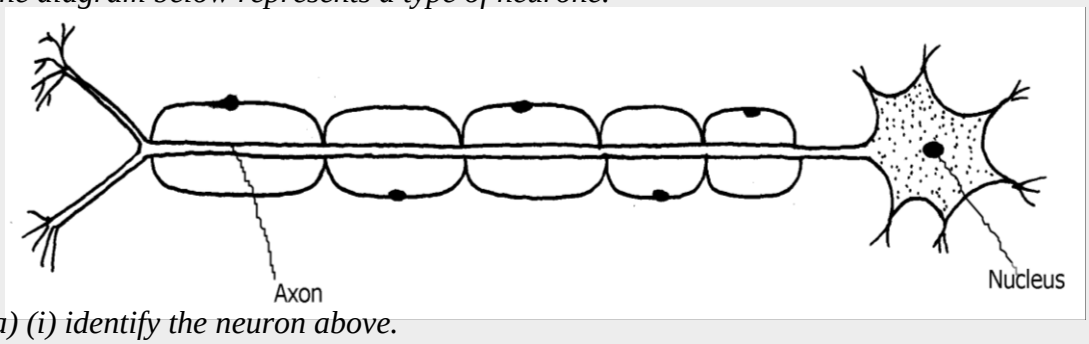
3. *Study the drawing below and use it to answer the questions that follow :-*



   a) Name the part labeled X.
   b) Describe the changes that occur in the structure X in dim light.
   c) What is meant by the term accommodation with reference to the eye?

4. *(a) State two differences between taxes and tropisms*
   (b) Give two survival values of tactic movements to organisms

5. *The diagram below represents a type of neurone.*

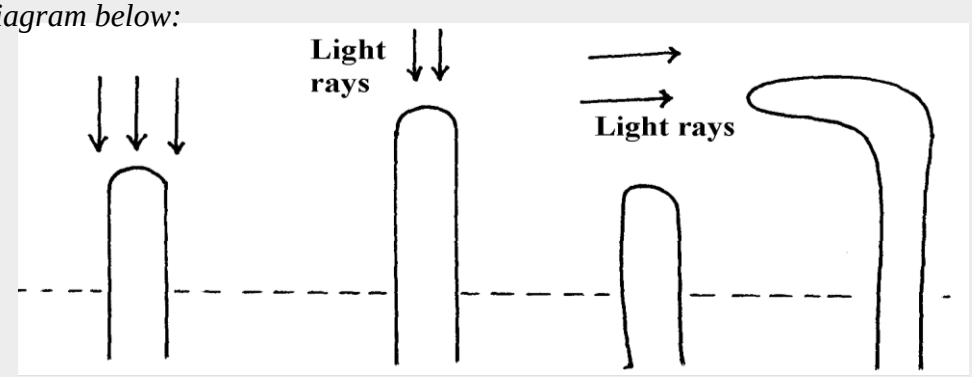


   (a) (i) identify the neuron above.
   (ii) Give a reason for your answer in a (i) above.
   (b) With an arrow, indicate on the diagram the direction of an impulse through the neurone.
   (c) Name the chemical substance that brings about transmission of impulse across a synapse

6. *A student was traveling from Nairobi to Mombasa. As the bus descended down hill he felt an unpleasant sensation in the ear.*

   (a) How did the sensation come about? *
   (b) How can the unpleasant sensation be relieved?

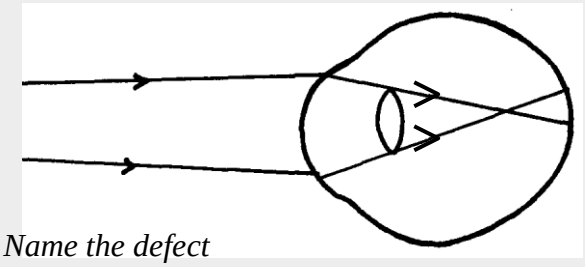
7. *An experiment was carried out to investigate a growth response in maize seedling as shown in the diagram below:*



   (a) State the type of response that is being investigated .....
   (b) Explain the response exhibited by the shoot

8. *State three genetic disorders caused by gene mutations*

9. *The diagram below shows the position of an image formed in a defective eye:-*

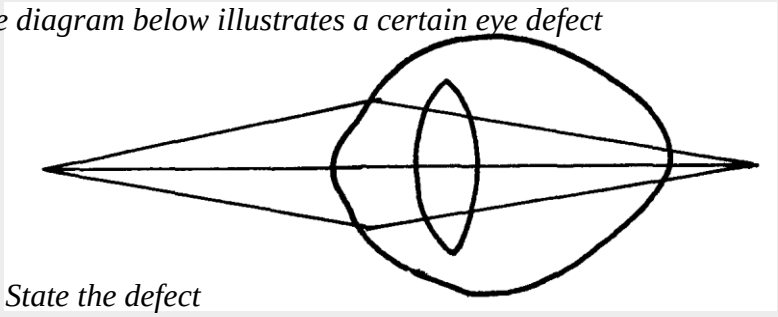


(a) Name the defect
(b)Explain how the defect named in (a) above can be corrected

10. *(a) State three structural differences between arteries and veins in mammals*
(b) Name a disease that causes thickening and hardening of arteries

11. *(a) Name the part of the eye in which the light sensitive cells are located*
(b) List the two types of sensory cells found in the part named in (a) above

12. *The diagram below illustrates a certain eye defect*



(a) State the defect
(b) On the diagram illustrate how the defect can be corrected
(c) State one advantage of having two eyes in human beings

13. *Briefly explain the role of the following part of skin*

a) Cornified layer
b) Malpighian layer

14. *State the functions of the following structures of the mammalian ear*

a) Eustachian tube
b) Essicles

15. *a) Distinguish between conditioned and simple reflexes*

b) State how the nerve cell structure is suited to its function of impulse transmission

16. *(a) Name the part of the mammalian eye that:*

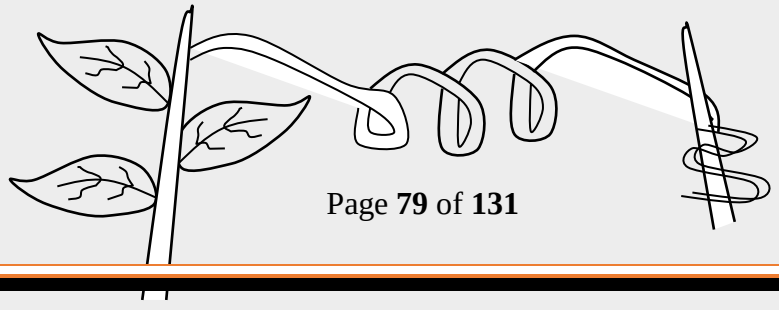
(i) Transmits impulses to the brain
(ii) Regulates the amount of light entering the eye

(b) State the changes that occur in the part of the eye named in (a) (ii) above when one moved from bright light to dim light conditions

16. *Name the type of response exhibited by the following:*

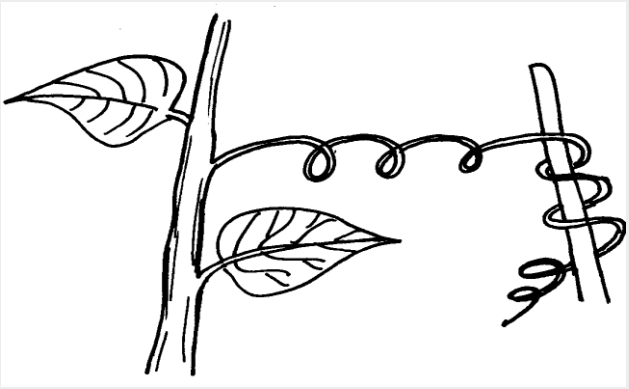
(a) A pollen tube growing towards the embryo sac
(b) Maggots moving from lit side of a box to the dark side

17. *A response exhibited by a certain plant tendril is illustrated below:*



(i) Name the type of response
(ii) Explain how the response named in (i) above occurs

18. *A response exhibited by a certain plant tendril is illustrated below:-*



Name the type of response

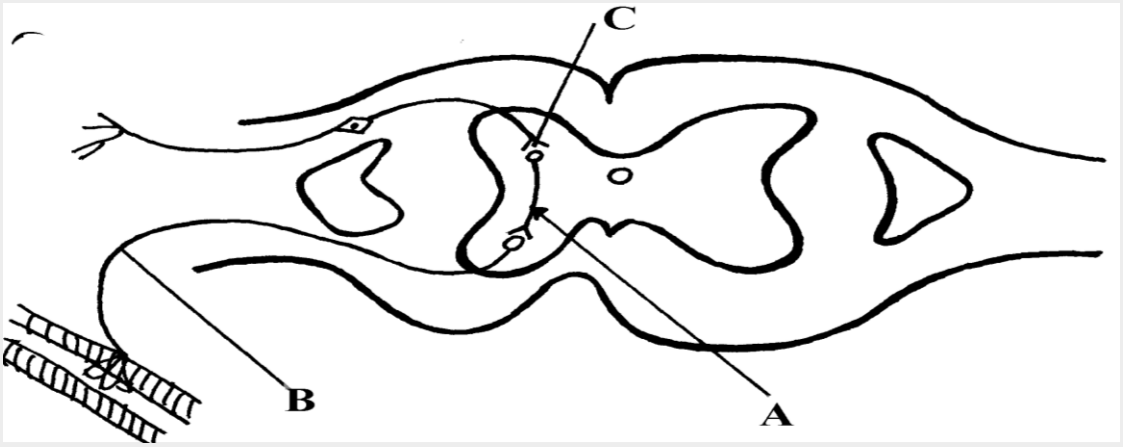
19. *Removal of the apical bud from a shrub is a practice that results in the development of many lateral buds which later form branches*

(a) Give reasons for the development of lateral branches after the removal of the apical bud
(b) Suggest one application of this practice?

20. *In an accident a victim suffered brain injury. Consequently he had loss of memory which part of the brain was damaged?*

21. *A person was able to read a book clearly at arm's length but not at normal reading distance*
(a) State the eye defect the person suffered from
(b) Why was he unable to read the book clearly at normal distance?
(c) How can the defect be corrected?

22. *The diagram below represents a simple reflex arc;*



(a) Name the parts labeled A and B
(b) Explain how an impulse is transmitted across the gap labeled C

23. *(a) State two functions of a mammalian ear*
(b) How is the cochlea suited to its function

24. *State one function of potassium ions in the human body.*

25. *State two functions of vitamin B_5 (pantothenic acid).*

26. *(a) What is the biological importance of tactic responses?*
(b) A person had an accident and had problems with his vision, hearing and memory. Identify the part of the brain that was affected

27. *Identify the following responses shown by plants:- (a) Shoots grow towards light*
(b) Roots grow towards gravity
(c) Tendril intertwine around an object

28. *Name the type of responses exhibited by:-*

(a) (i) Marine crabs burrowing into the sand to avoid dilution of their body fluids
(ii) Chlamy domonas plant moving towards a region of high light intensity
(b) (i)What type of neuron is drawn above?
(ii) Using an arrow, show the direction of the nerve impulse
(iii) Name the part labelled X
(iv) State the function of part labelled Y .
(c) Give two differences between reflex action and conditioned reflex action

29. *In an experiment to investigate the effect of heat on germination of seeds, 12bags each*

Containing 60 pea seeds were placed in a water bath maintained at 85°C .
After every two minutes a bag was removed and seeds contained in it planted. The number that germinated was recorded. The procedure used for pea seeds was repeated for wattle seeds. The results were as shown in the table below:-

	Number of seeds that germinated	
Time (min)	*Pea seeds*	*Wattle seed*
0	*60*	*0*
2	*60*	*0*
4	*48*	*0*
6	*42*	*2*
8	*34*	*28*
10	*10*	*36*
12	*2*	*40*
14	*0*	*44*
16	*0*	*46*
18	*0*	*48*
20	*0*	*49*

22	0	47

(a) Using a suitable scale and same axes, draw graphs of number of seeds that germinated against time in hot water for each plant

(b) (i) At what time would number of seeds that germinated for each plant be same?

(ii) How many wattle seeds would have germinated if the 13th bag was available and was removed and seeds contained in it planted at 24minutes?

(c) Explain why the ability of pea seeds that germinated declined with time of exposure to heat

(d) Explain why the ability of the wattle seeds to germinate improved with time of exposure to heat

(e) Account for the shape of the graph for the wattle seeds which germinated between 20-24 minutes

(f) Some of the pea seeds were allowed to germinate and placed in a large air tight flask and left for four days:-

(i) Suggest the expected changes in the composition of gases in the flask on the fifth day

(ii) Give reasons for your answer in (f)(i) above

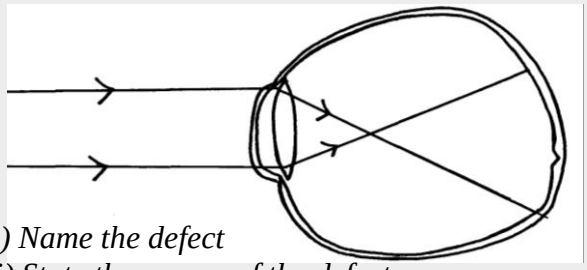
(g) Name three factors other than those investigated in (a) above which would affect dormancy

30. *How is the mammalian skin adapted to its functions?*

31. *Explain how the mammalian skin is adapted to it's functions*

32. *Explain the structure and functions of the human eye.*

33. *The diagram below shows the position of an image in a defective eye.*



(a) (i) Name the defect

(ii) State the causes of the defect

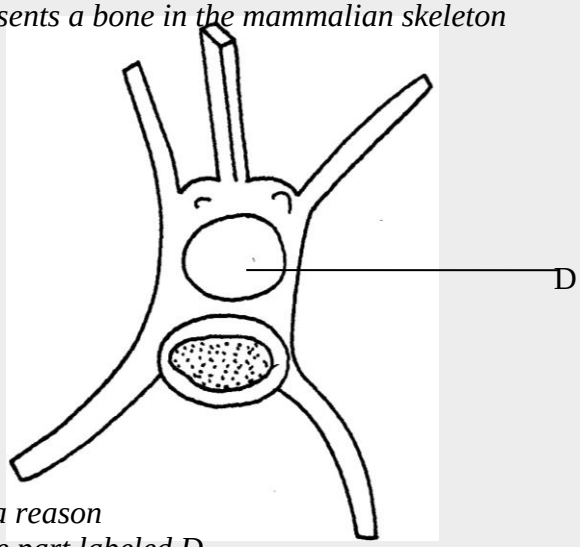
(b) Explain how the defect in a(i) above can be corrected.

(c) State the functions of cones

(d) How are nocturnal animals adapted to seeing?

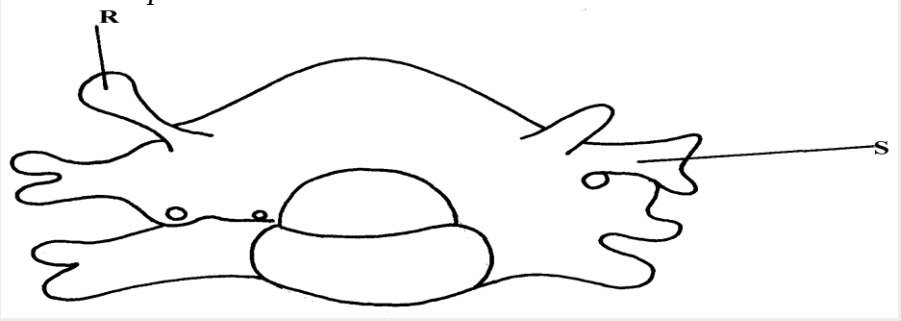
5. SUPPORT AND MOVEMENT IN (A) PLANTS (B) ANIMALS

1. *Explain how the following tissues are adapted to provide mechanical support in plants:-*
   a) Parenchyma
   b) Collenchyma
   c) Selerenchyma
2. *The diagram below represents a bone in the mammalian skeleton*



   a) Identify the bone with a reason
   b) State the function of the part labeled D

3. *The diagram below represents a mammalian bone*



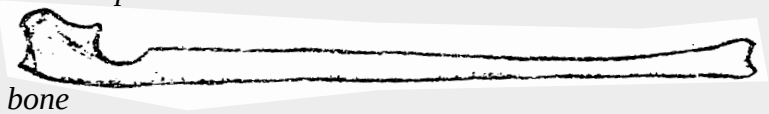
(a) Identify the bone shown above
(b) State the function of the parts labelled R and S
(c) State the region of the body in which the bone is found

4. *(i) Name two bones that form the ball and socket joint in the fore limb of a mammal*
(ii) Name the fluid that is found in the above mentioned joint and its function

5. *State three types of skeleton found in Kingdom animalia*

6. *State three differences between an animal's muscle cell and plant's palisade cell*

7. *The diagram below represents a mammalian bone*



(a)Name the bone
(b) (i) Which bone articulates with the bone shown in the diagram at the notch
(ii) Name the type of joint formed when the bones in b(i) articulate

8. *(a) Name the hard outer covering of the members of the phylum Arthropoda*
(b) State two roles played by the structure named in (a) above

9. *(a) State the role of lignin in the wall of the xylem vessel*
(b) How does vascular bundles contribute to support in plants

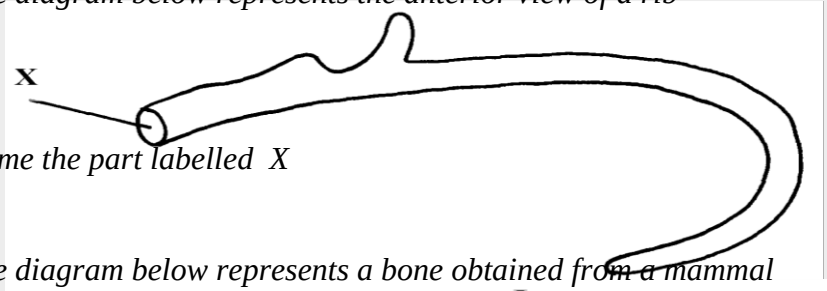
10. *(a) Distinguish between tendons and ligaments*
b) State one way through which herbaceous plants achieve support

11. *Name the ;*

a) i) Material used to strengthen the xylem tissue
ii) Tissue that is removed when the bark of a dicotyledonous plant is ringed
b) State the areas of the plant where translocated materials are taken

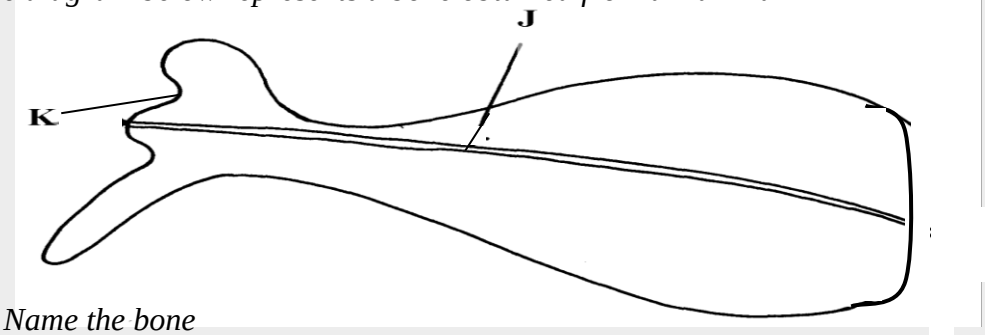
12. *Give three importance of mammalian skeleton*

13. *The diagram below represents the anterior view of a rib*



Name the part labelled X

14. *The diagram below represents a bone obtained from a mammal*



a) Name the bone

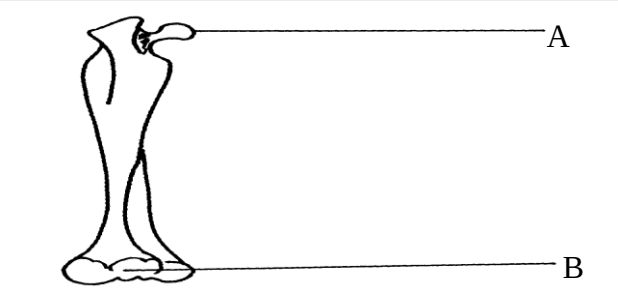
b) Name the:

i) Bones which articulate with the bone named in (a) above at the cavity labelled K

ii) Joint formed by the two bones at K

c) State functions of part labelled J

15. *The diagram below represents a bone obtained from a mammalian skeleton:*



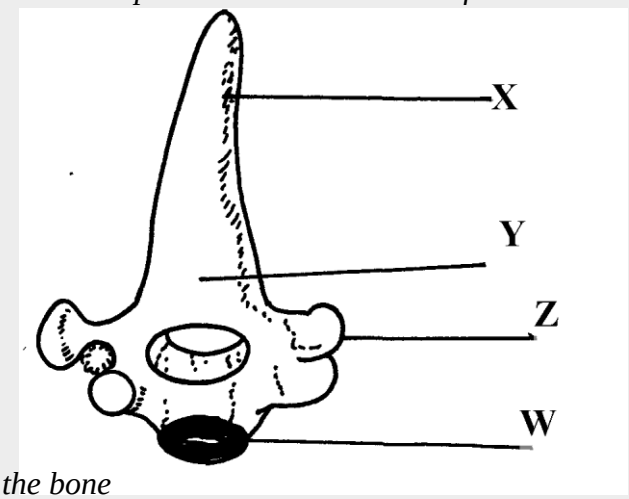
(a) Identify the bone

(b) Name the:

(i) Bone it articulates with at point A

(ii) Type of joint that forms at point B in articulation with other bones

16. *The diagram below represents a bone obtained form a mammal*



(a) Identify the bone

(b) Name the structures labeled X and W

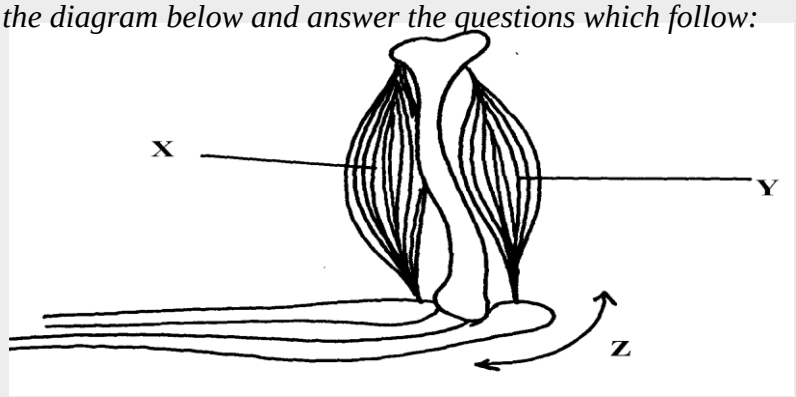
(c) Name the bone that articulate with structure labeled Z

17. *(a) Name the vertebra in a mammalian body that is characterised by presence of odontoid process.*

(b) State the function of the odontoid process

18. *a) Name three supporting tissues in plants*

b) Study the diagram below and answer the questions which follow:



i) Identify the muscle represented by X and Y

ii) Describe how muscles x and y cause straightening of the joint z

c) Name the joint z

19. *(a) What is the importance of locomotion in animals?*

(b) Explain how a bony fish is adapted for movement in its habitat

16. HUMAN HEALTH

1. *a) Name the causative agent of cholera.*

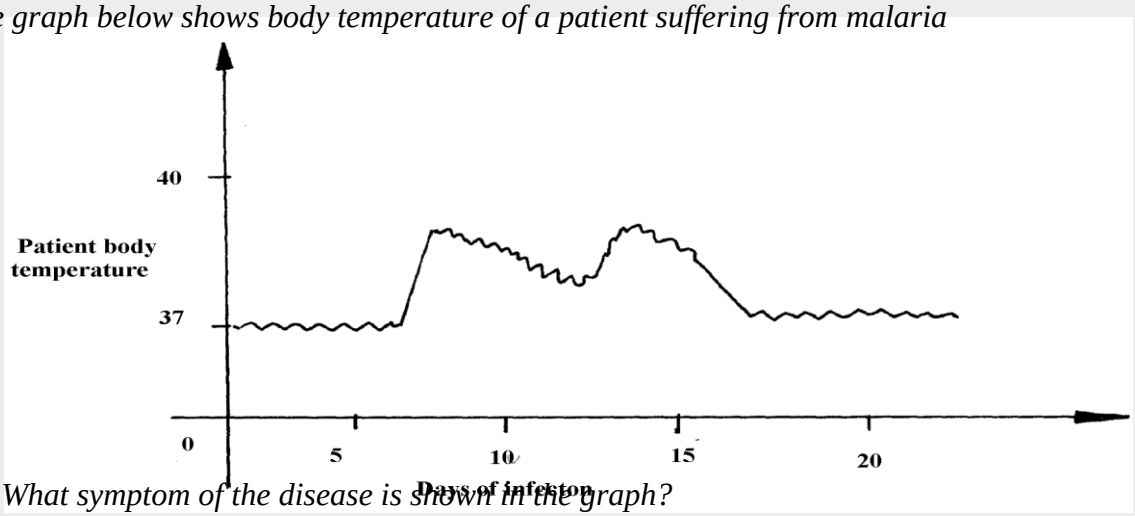
b) Name the intermediate hosts in the life cycle of the following parasites;

i) Ascaris lumbricoides.

ii) Schistosoma haematobium.

c) How does the parasite plasmodium vivax gain entry into its host?

2. *The graph below shows body temperature of a patient suffering from malaria*



(a) What symptom of the disease is shown in the graph?

(b) Name the organism that causes malaria

(c) Suggest one method of controlling spread of malaria

3. *Name the causative agent of typhoid*

4. *Malaria is a common disease in Kenya:-*

(a) What causes the disease?

(b) State one control measure of the disease

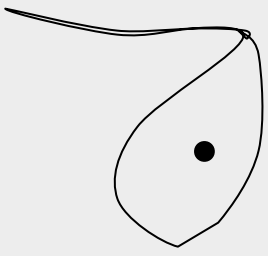
5. *a) Name the causative agents of the following disease in humans:-*

i) Typhoid;

ii) Amoebic dysentery;

b) Name the disease in human cased by plasmodium falciparum

6. *Below are diagrams of disease causing micro-organisms. Use them to answer the questions that follow:*



A

B

(a) State the kingdom to which they are found.

(b) Name the diseases caused by the organisms: A and B

(c) State one way in which the disease named for organism B can be prevented

7. *Explain why it is important to go for voluntary counseling and testing (VCT) on HIV/AIDS*

8. *Name one human disease caused by each of the following parasites.*

(a) Plasmodium falciparum……

(b) Entamoeba histolytica ……

BIOLOGY PAPER THREE
QUESTIONS AND CONFIDENTIALS

SECTION III- QUESTIONS
CONFIDENTIAL INFORMATION TO SCHOOLS AND PRACTICALS

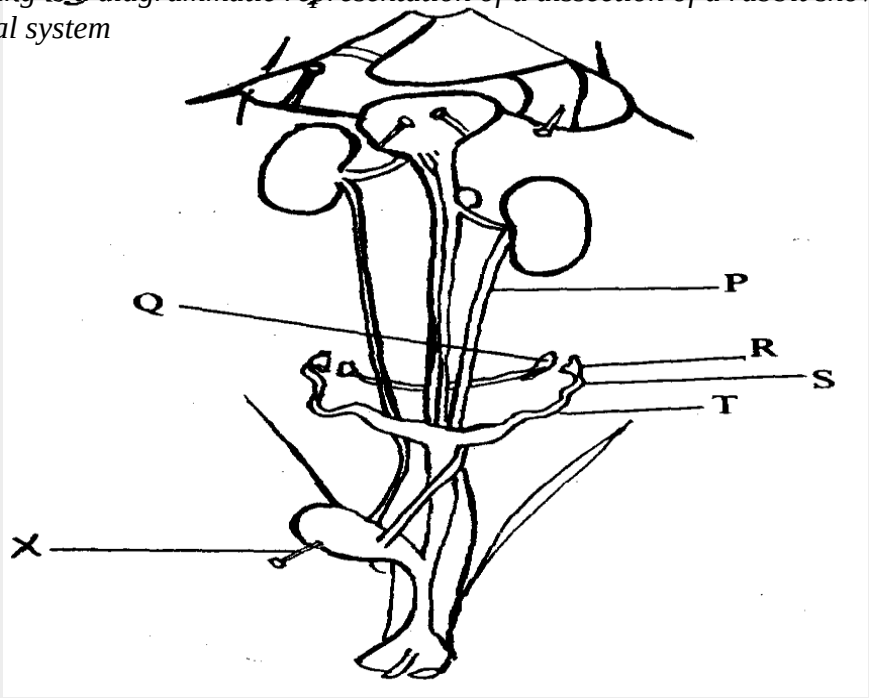
KAKAMEGA CENTRAL DISTRICT

Each candidate will require the following:-

- *Solution V- sucrose laboratory chemicals*
- *Solution W – Glucose*
- *Means of heating*
- *2 test tubes*
- *Benedicts solution (10mls)*
- *Dilute HCl (5mls)*
- *Sodium hydrogen carbonate solution*
- *Access to water*
- *A dropper*
- *Measuring cylinder (to measure 10mls)*

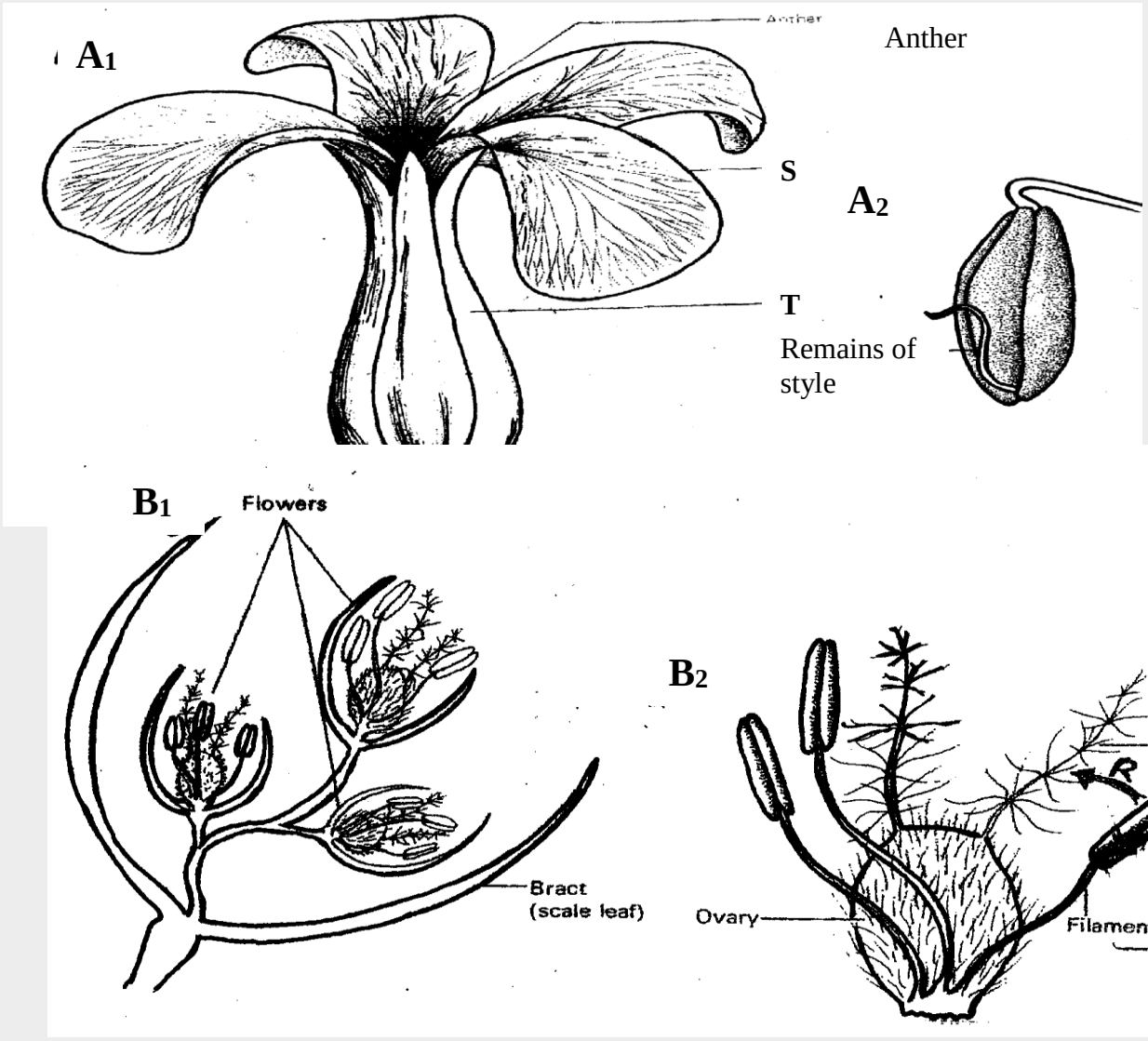
1. *a) Identify solutions V and W by carrying out the food tests as indicated in the table below*
   b) Which of the two solutions V and W would you recommend for a person who needs an immediate source of energy? Give a reason for your answer.

2. *The following is a diagrammatic representation of a dissection of a rabbit showing the urinogenital system*



a) In the table below, name the structures labeled P, Q, S and T. For each of the structures, state one function
b) i) Identify the sex of the rabbit that was dissected
ii) Give two reasons for your answer in b(i) above
c) Name the instrument labeled x in the diagram above

3. *Study the photographs below and use them to answer the questions that follow;*



a) Using the number of flowers arising from the shoot of each plant, state the flowers labelled A_1 and B_1

b) Name the class of the plant from which each of the flowers was obtained. Give a reason for your answer in each case :

c) Name the parts labelled S and T

d) What type of ovary is shown in flower B_1? Give a reason for your answer.

e) i) Name the agent responsible for the process represented by the arrow labelled R in B_2

ii) Give a reason for your answer in e (i) above

iii) List two other features (not shown in the photograph) expected of such flowers as B_1

f) i) Name an agent that brings about a similar process as the one shown by the arrow in B_2 for A_1

ii) Give a reason for your answer in f(i) above.

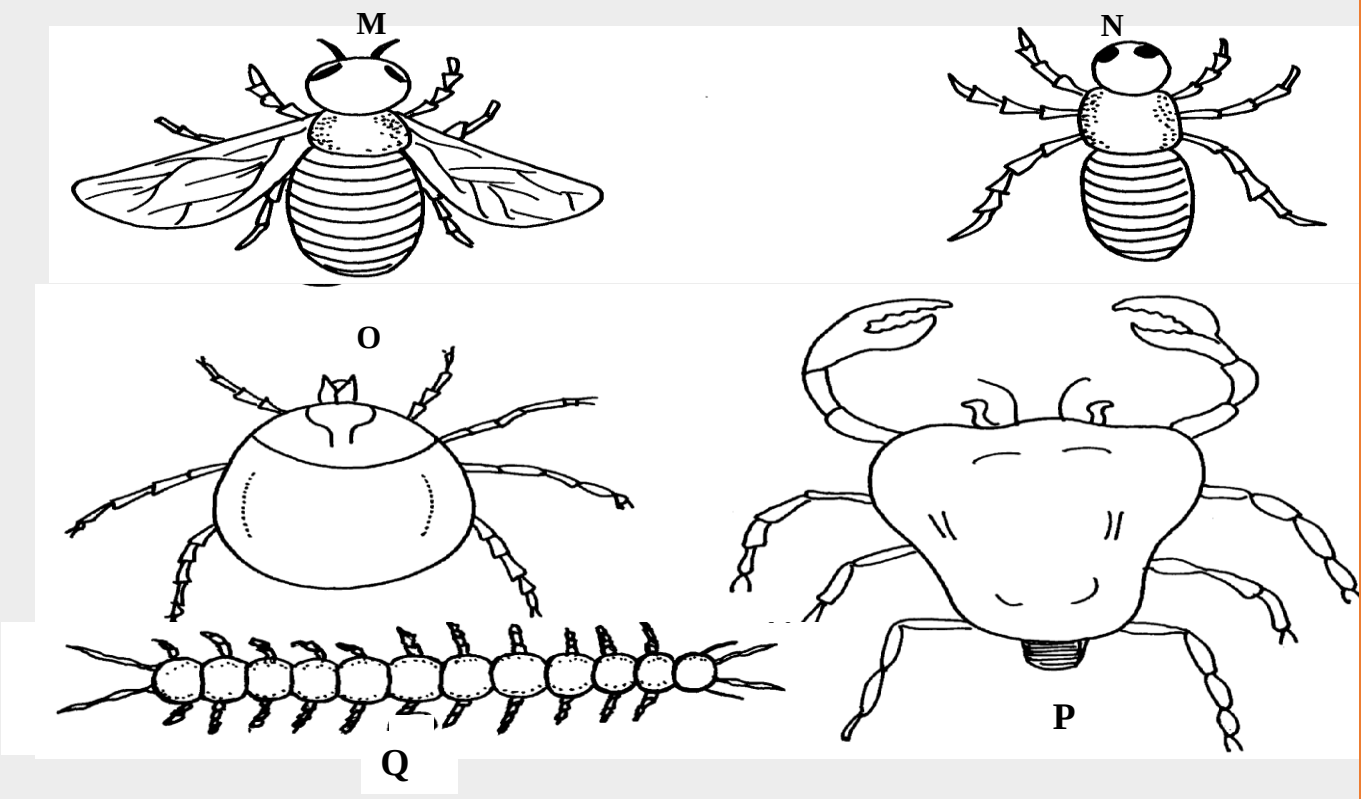
g) What is the likely agent of dispersal of the specimen labelled B_2?

KAKAMEGA EAST DISTRICT

Each candidate requires the following:-

- *One large ripe tomato labelled D_1*
- *One ripe orange/lemon fruit labelled D_2*
- *5ml DCPIP (1g of DCPIP dissolved in 1000cm^3 of distilled water)*
- *Four clean test tubes*
- *Three droppers*
- *Scalpel blade*

1. *Study the diagrams M, N, O, P and Q below representing organisms in the environment and use them to answer the following questions:-*



(a) With the reasons, identify the phylum to which they belong:-

(b) Identify the classes of the following organisms:-

M ..... *N* .....

O ..... *P* .....

Q .....

(c) Give two reasons for identifying the classes of organisms M and P

(d) What is the economic importance of the class to which M belongs?

2. *You are provided with specimen D_1. Make a vertical (longitudinal section through it to obtain two equal halves)*

(a) (i) Draw and label one half of D_1

(ii) Calculate the magnification of your drawing (show your working)

(iii) With reasons, identify the type of fruit D_1

(b) Squeeze juice from D_1, into a beaker. Label two test tubes A and B. In each test tube put 1cm^3 of DCPIP

(i) To test tube A add the juice drop by drop shaking well after each drop. Record the number of drops required to decolourize DCPIP in the table below.

TEST TUBE	*No. of drops required to decolourize DCPIP*

A	
B	

(ii) Identify the food substance being tested

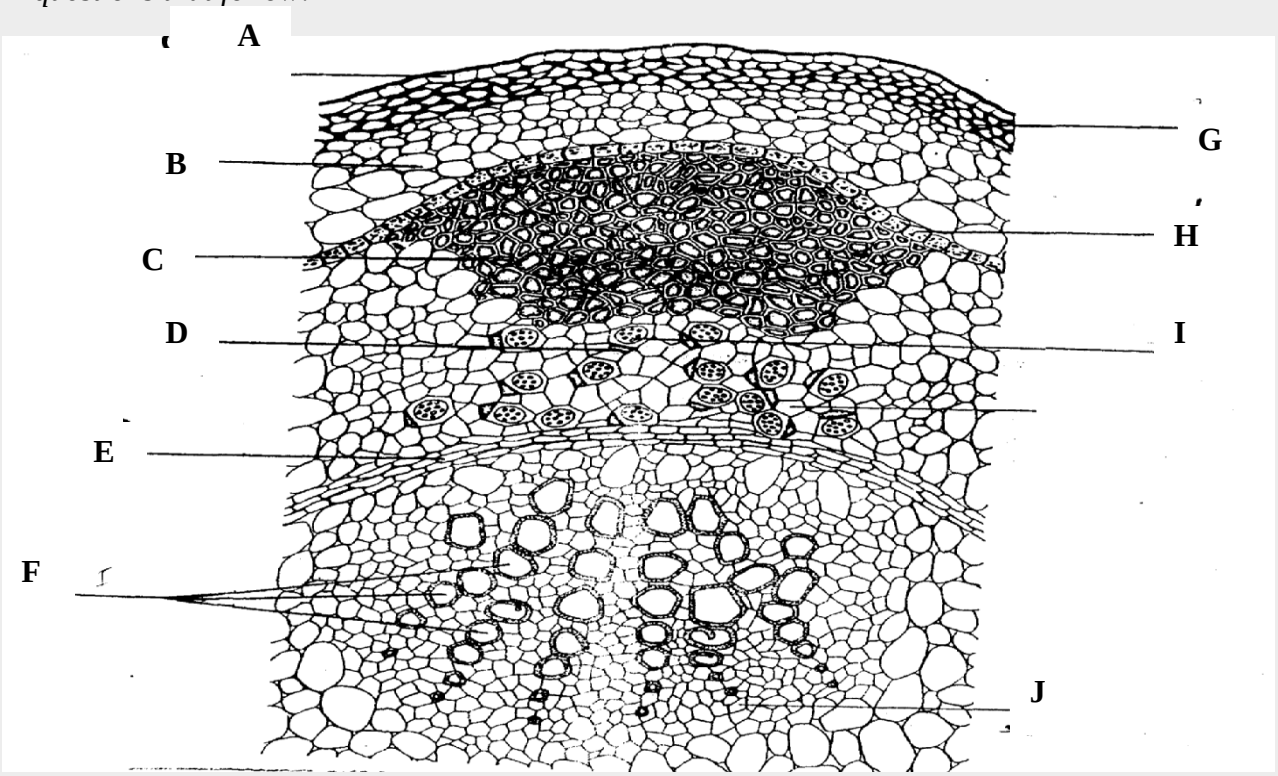
(iii) Which of he specimens P_1 and P_2 has high of the food substance being tested above?

(iv) What is the value of the food substance above to a growing baby?

(c) Boil the remaining juice extracted from D_1 in the boiling tube for one minute and cool it. Using a dropper, add the boiled juice into another test tube labelled B. Containing $1cm^3$ of DCPIP. Record the number of drops required to decolourize the DCPIP in the table above.

What is the effect of boiling the juice?

3. *The diagram below represents a cross-section of a plant stem. Study it carefully and answer the questions that follow:-*



(a) Identify letters that represent tissues responsible for support and name the tissues

(b) State two ways in which the tissues named in (a) above offer support

(c) (i) Identify the part labelled H .....

(ii) What is the role of this part?

(d) (i) If the plant from which the section had been obtained was placed in water containing eosin dye, which part would you expect to be stained with the dye?

(ii) Name three forces which help water containing this dye (eosin) to pass through the dyed tissue

(e) (i) Name the tissues labelled I .....

(ii) What is the name of the cell C seen adjacent to tissue I?

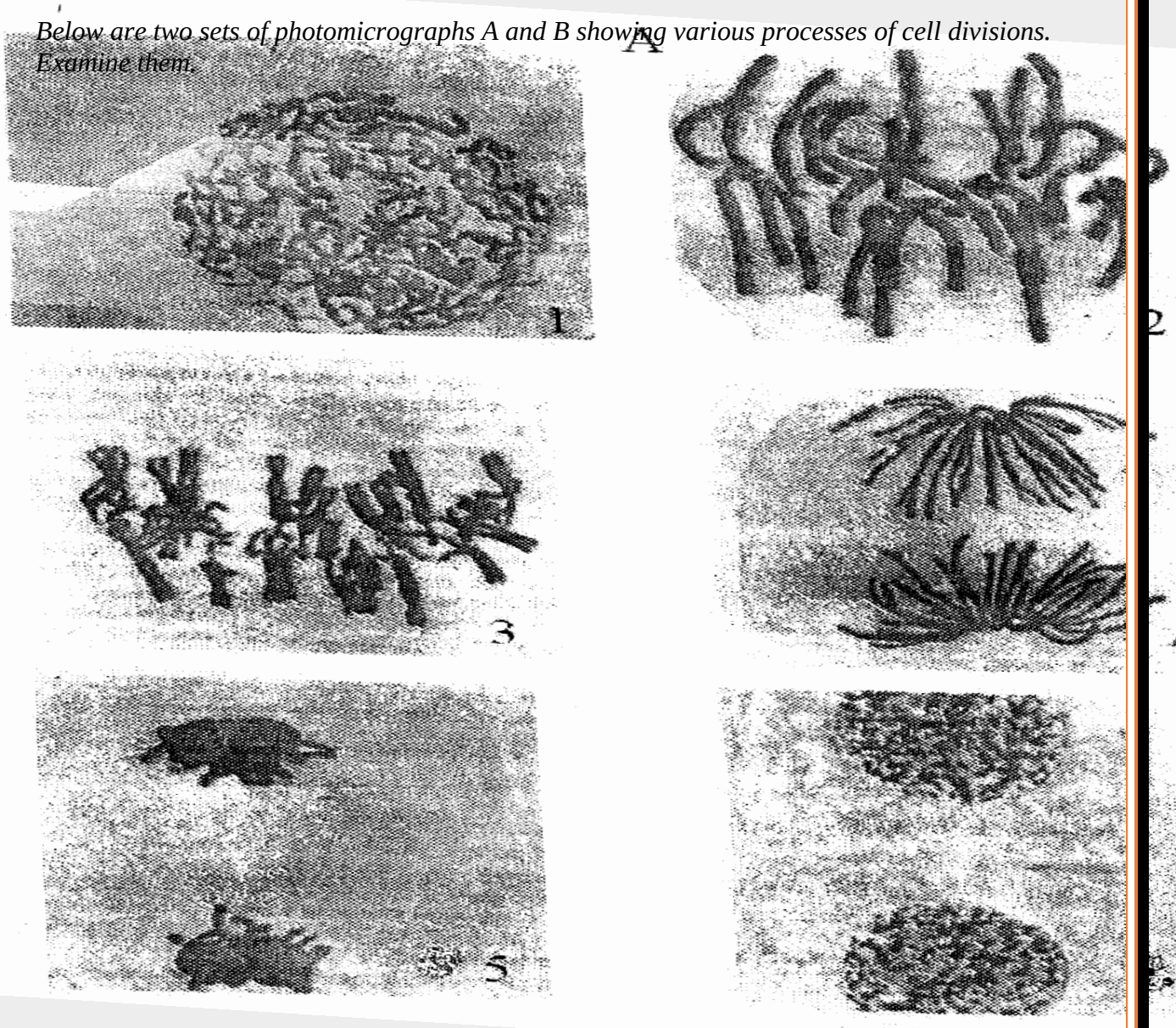
(iii) State the function of this cell C

MIGORI DISTRICT

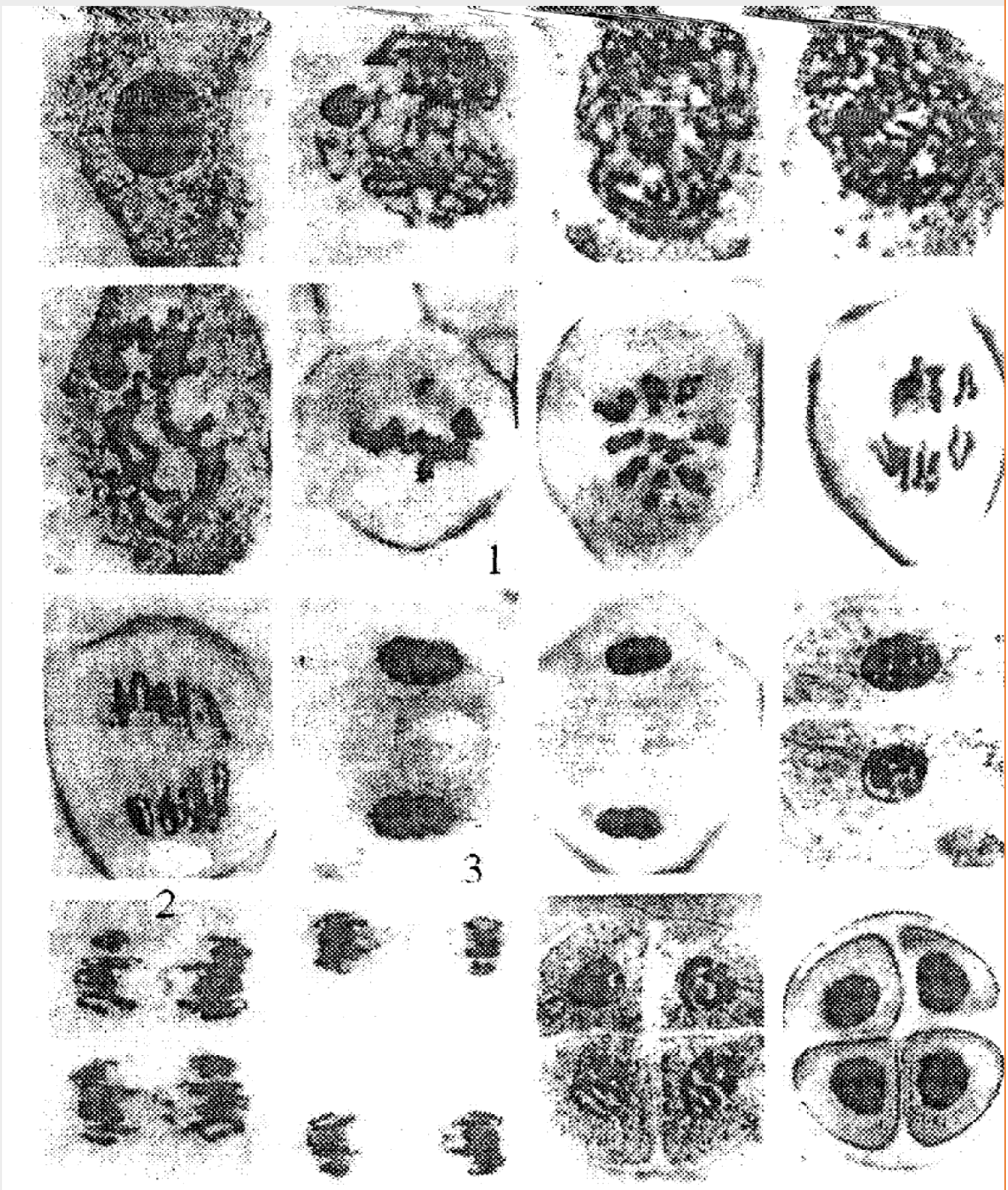
Each candidate should be provided with the following:

- *Irish potato (one large one each – N)*
- *75 ml of conc. brine labelled L_1.*
- *75 ml of distilled water labelled L_2.*
- *Potato borers.*
- *Six test tubes.*
- *Iodine.*
- *Benedict's solution.*
- *Sodium hydroxide.*
- *10% copper II sulphate.*
- *Means of heating.*
- *Means of timing.*
- *A ruler.*

Q.1 Below are two sets of photomicrographs A and B showing various processes of cell divisions. Examine them.



B



Q. *(a) Using observable features only, identify the type of cell division represented by the photomicrographs in set A and set B. Give a reason in each case.*

Cell division in set A

Reason:

Cell division in set B.

Reason:

(b) Name the division process represented by number 3 and 4 in photomicrographs of set A and number 1 and 3 in photomicrographs in set B. Complete the table below.

(c) Name one region in higher pants where the cell division represented by photomicrographs set A and B occurs.

(d) Describe the process that is taking place at photomicrographs set A number 3 and photomicrograph set B number 2.

(e) State the importance of each of the cell division in A and B in the bodies of living organisms.

2. *You are provided with specimen N. You have also been provided with a cork borer bore out three (3) pieces each measuring 5 cm. Take each piece and place into the test tubes labelled A, B and C separately.*

Fill test tube A with solution labelled L_1.

Fill test tube B with solution labelled L_2.

Leave test tube labelled C empty (Do not pour anything into it.)

(a) (i) Remove the pieces and dry each using blotting paper and measure its length. Record in the table below.

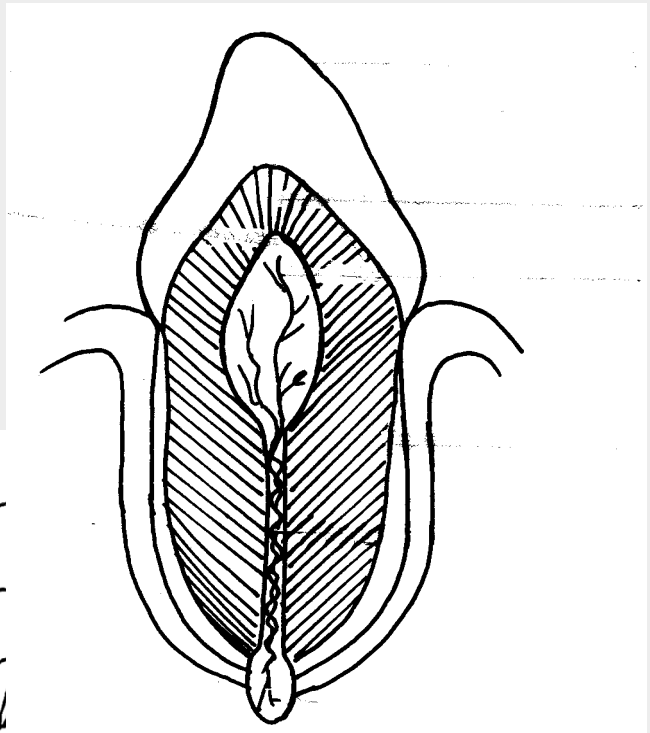
(ii) Account for the observation made in the measurements of each piece after 30 minutes above.

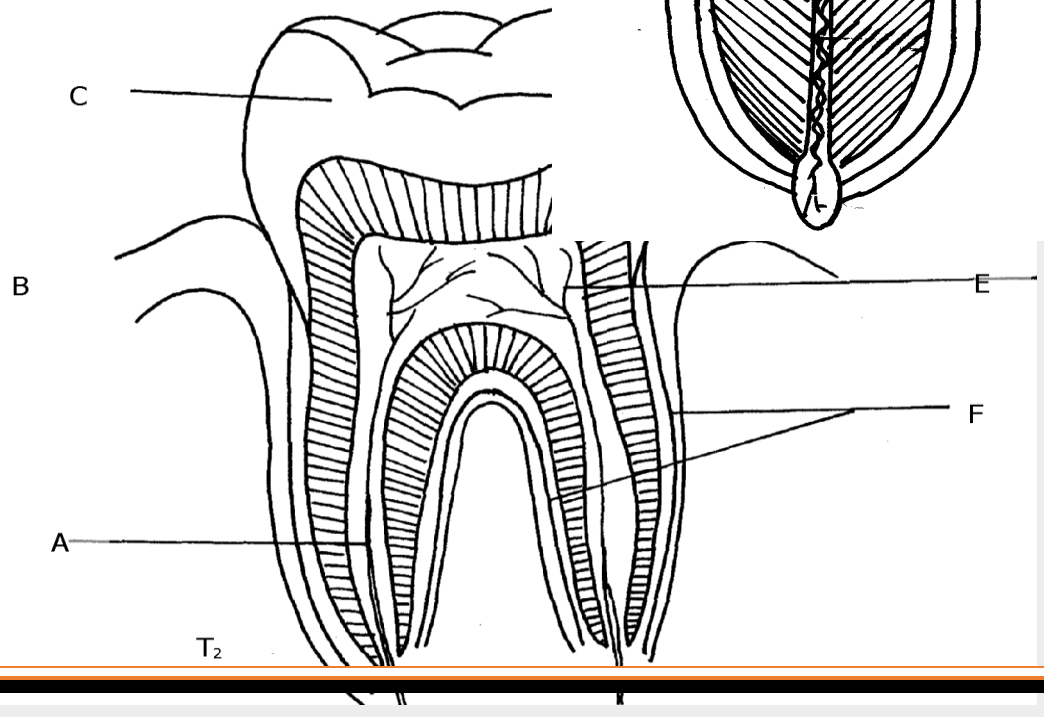
(b) (i) Crush the remaining tissue into a paste and carry out food tests on it using the reagents provided.:

(ii) What would imbalances of such food substances cause in the diet?

Excess of the foods.

Deficiency of the foods.





3. *Study the photographs provided above and answer the questions below.*
(a) Give the identity of T_1 and T_2.
(b) How is each specimen adapted to its function?
(c) Label the parts of T_2 marked A to F
(d) State the effect of too much sugar in the diet on specimen T_1 and T_2 in humans.
(e) (i) What is the name of the gap found between T_1 and T_2 in herbivores.
(ii) State the function of the gap named in e(i) above.

CONFIDENTIAL INFORMATION TO SCHOOLS AND PRACTICALS

NYAMIRA DISTRICT

Each Candidate should be provided with the following:-

REQUIREMENT

- *2 Boiling tubes*
- *2 test tubes*
- *Test tube rack*
- *Means of heating*
- *1% copper sulphate solution*
- *2M sodium hydroxide solution*
- *Iodine solution*
- *Mortar and pestle*
- *Scalpel*
- *20% Hydrogen peroxide solution*
- *Fresh potato*
- *Droppers*
- *100ml beaker*

Schools should also have ordinary laboratory apparatus in addition to those listed above

1. *You have been provided with specimen Q which is a fresh potato, liquid R (Hydrogen peroxide and reagents 1% copper sulphate, 2M sodium hydroxide and iodine solution. Use them to carry out the tests below:*
(a) Using a scalpel, cut two small cubes measuring 1cm x1cm from the fresh potato. Place one of the cubes in boiling water for 10minutes,then remove the cube and let it cool. Place it in a boiling tube and label it A.
Place the fresh piece of potato cube in another boiling tube labelled B and then add equal amounts of hydrogen peroxide to each test tube at the same time. Write your observations.

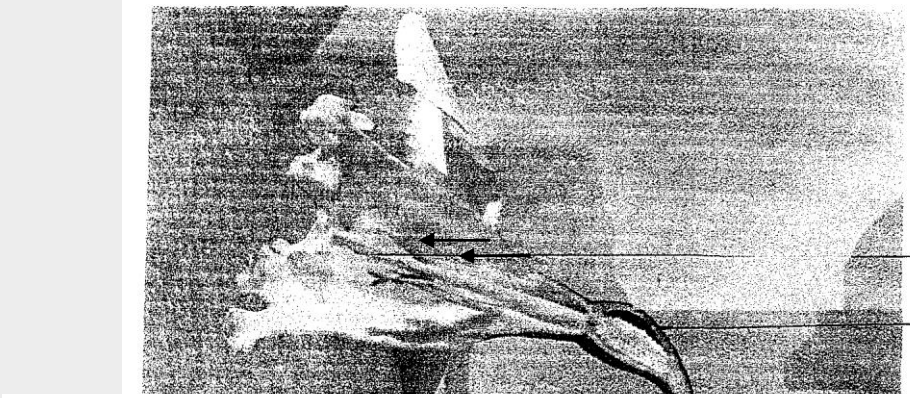
Observations:
(a) (i) Boiling tube A

(ii) Boiling tube B

(b) Explain your observations in (i) and (ii) above

(c) Crush a small piece of the remaining potato in a motar. Add a little amount of distilled water to make a mixture. Use it to carry out food tests below:

2. *X and Y are specimens obtained from plants. Study them carefully and then use them to answer questions that follow:-*



(a) Label the parts:-

S..... *T*.....

U..... *V*.....

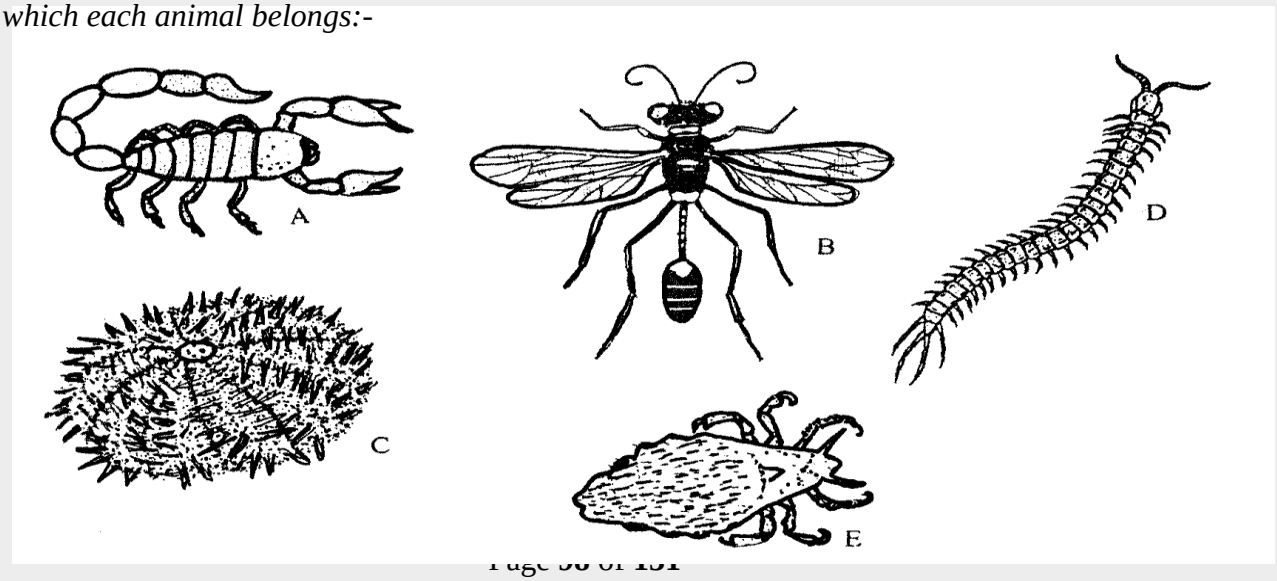
(b) State with reasons the mode of pollination for specimen

X

Y:

(c) Name the part of specimen X that develops into a fruit

3. *You are provided with photographs of animals which belong to the same phylum. Study the photographs and the dichotomous key below to enable you identify the taxonomic group to which each animal belongs:-*



1. (a) Jointed legs present .....Go to 2
   (b) Jointed legs absent .....Go to 7
2. (a) Three pairs of legs .....Go to 3
   (b) More than three pairs of legs .....go to 5
3. (a) Wings present .....Go to 4
   (b) Wings absent.....Anoplura
4. (a) One pair of wings .....Diptera
   (b) Two pairs of wings .....Hymenoptera
5. (a) Four pairs of legs .....Arachnida
   (b) More than ten pairs of legs.....Go to 6
6. (a) One pair of legs in each body segment.....Chilopoda
   (b) Two pairs of legs in each body segment.....Diplopoda
7. (a) Body partially closed in a shell .....Mollusca
   (b) Body surface has spiny projections .....Echinodermata

(a) Using the key, identify organisms A to E giving the sequence of steps followed to arrive at the identity of each organism

(b) (i) Using observable features only, state the phylum to which the organisms on the photograph belong:

(ii) State one observable feature that enables you to arrive at the answer in (b) (i) above

CONFIDENTIAL INFORMATION TO SCHOOLS AND PRACTICALS

SOTIK DISTRICT – 1ST EXAM

1. egg albumen
   Pineapple juice mixture (10ml) } labelled Z
   Iodine solution
   Ethanol
   Distilled water
   DCPIP
   Benedict's solution
   Source of heat (hot water bath)
   Four (4) test-tubes
   2. Bougainvillea leaf –P
   Kikuyu grass leaf -Q
   Hand lens

   3. Hand lens
   Freshly killed housefly
   Safety pin/pair of forceps

1. (a) You are provided with the solution labelled Z. Using the apparatus and the reagents provided, carry out the tests for the various food substances

Food	Procedure	Observation	Conclusion

(b) State the organ(s) which produce(s) enzyme(s) which are required to digest the contents of solution Z completely

(c) Name the end products of digestion of solution Z
(d) Give two functions of the products named in (c) above in the human body

2. *You are provided with the specimens P and Q:*

(a) (i) What is the mode of nutrition for the organisms represented by the above specimens?
(ii) Give a reason for your answer in (a) (i) above
(iii) Write an equation for the physiological process involved in the mode of feeding in (a)(i) above

(b) Draw and label specimen P
(c) State three observable differences between specimens P and Q
(d) Name the trophic level of the organisms from which the specimens were obtained in the ecosystem
(e) Explain the role played by the organisms in the ecosystem
(f) Which features adapt specimen Q to enabling the organism from which it was detached to live in its habitat?

3. *Using a hand lens, study the specimen provided and answer the questions that follow:*

(a) Give the phylum and the class to which the specimen belongs

(b) State two characteristics which are unique to members of the class suggested in (a) above

(c) Using the observable features only, explain how the specimen is adapted to living in its habitat.

CONFIDENTIAL INFORMATION TO SCHOOLS AND PRACTICALS

UGENYA - UGUNJA DISTRICT

Each student should be provided with the following:-

- *Onion bulb*
- *Iodine solution (5ml)*
- *Cover slip (1pc)*
- *Microscope slide (1pc)*
- *Means of labeling*
- *Hydrogen peroxide – 5ml per student*
- *Test tube (4)*
- *Distilled water*
- *Saturated sodium Chloride solution – Liquid H – 5ml per student*
- *Blotting paper (1pc)*
- *Means of timing*
- *Pestle and Mortar*
- *Piece of liver*
- *Wooden splint*
- *Benedicts solution – 5ml*
- *Scalpel blade*
- *Means of heating*
- *Boiling tube (1)*
- *Glass rod*
- *A pair of forceps*
- *Microscope (one for a group of five)*

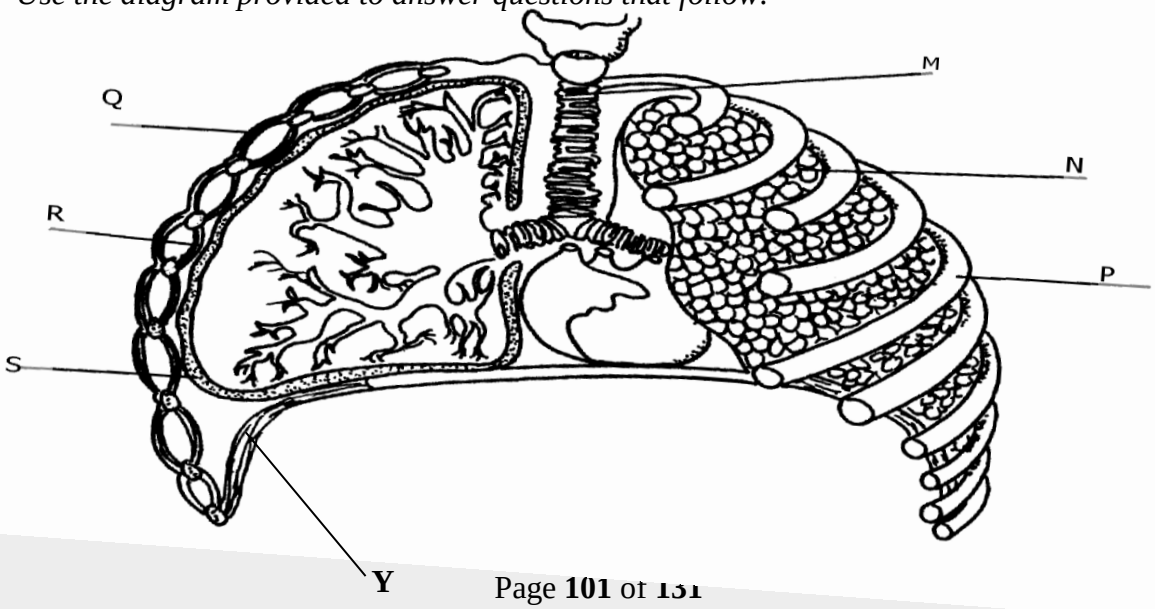
N/B – Provide a medium power objective lens of x10 and eye piece lens of x10 or x15.

1. *You are provided with a portion of an onion bulb. Remove one fleshy leaf from the onion bulb, peel the epidermis from the inner surface of the leaf and place it on a drop of iodine solution on a glass slide. Place a cover slip on the epidermis. Drain the excess iodine solution by use of a piece of blotting paper from the edge of the cover slip then leave the set up for one minute.*
   Place a drop of liquid H at the edge of the cover slip. Leave the set up for 5 minutes then drain excess liquid from the opposite of the slip using a blotting paper. Observe under medium power of the light microscope provided.
   (a) Draw and label two neghbouring cells
   (b) Account for the results in (a) above
   (c) Using a pestle and mortar, crush two fleshy leaves of the onion bulb, add 4mls of distilled water and stir. Decant into a test tube and label the resultant filtrate as solution J_1 and retain the residue.
   Using the reagents provided, carry out food tests on solution J_1 and fill the table below:

FOOD SUBSTANCE	*PROCEDURE*	*OBSERVATION*	*CONCLUSION*

   (d) Label one test tube as J_2 and another as K . Add 2mls of Hydrogen peroxide to each of the test tubes.
   (i) Into the test tube labelled J_2, place the entire residue obtained in (c) above and immediately introduce a glowing splint. Record your observations in the table below. Into the test tube labelled K, place the piece of liver provided then immediately introduce a glowing splint into the mouth of test tube and record your observations in the table below.
   (ii) Name the enzyme responsible for the reactions in the test tubes above
   (iii) Explain the significance of the difference in the observations in part (i) above

2. *Use the diagram provided to answer questions that follow:*



(a) Name the bones that articulate with the structure labelled P

(i) Dorsally .....

(ii) Ventrally.....

(b) Give three adaptations of structure M to its functions

(c) (i) Name the fluid found within the part labelled S

(ii) State the function of the fluid named in (c) (i) above

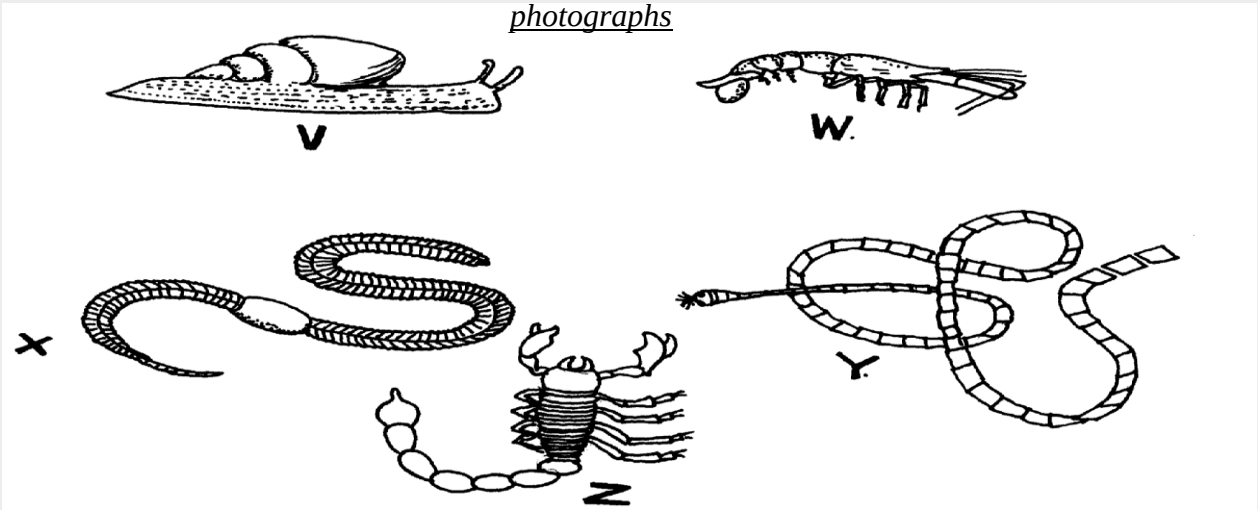
(d) Identify the parts labelled: Q & R

(e) State two changes that take place in the organ labelled N when the structure Y contracts

(f) How is large surface area achieved for efficient functioning of the organ labelled N?

3. *A student collected a number of invertebrates whose photographs appear below. He constructed a Dichotomous key as shown below to enable him place each specimen into its taxonomic group*

photographs



DICHOTOMUS KEY

1. (a) Organisms with a flat body	*Go to 9*
(b) Organisms without a flat body	*Go to 2*
2. (a) Organisms having a body in a shell	*Mollusca*
(b) Organisms without a shell	*Go to 3*
3. (a) Organisms having a segmented body	*Go to 4*
(b) Organisms with a body not segmented	*Nematoda*
4. (a) Organisms having jointed appendages	*Go to 6*
(b) Organisms without jointed appendages	*Go to 5*
5.(a) Organisms with a long cylindrical body	*Annelida*
(b) Organisms having a short stout body	*Trematoda*
6. (a) Organisms with antennae	*Go to 7*
(b) Organisms lacking antennae	*Go to 8*
7. (a) Organisms with a pair of antennae	*Insecta*
(b) Organisms with more than one pair of antennae	*crustacea*
8. (a) Organisms with pincer-like mouth parts	*Arachnida*
(b) Organisms with sucking mouth parts	*Acarina*
9. (a) Organisms having a ribbon like body	*Cestoda*
(b) Organisms with circular body	*Crinoidea*

(a) Using the dichotomous key, identify the taxonomic group of each of the five specimens shown in the photographs. In each case show in sequence, the steps in the key that you have followed to arrive at the identity of each specimen.

(b) Name a pathogen that attacks human beings and is associated with the organism labelled V

NDHIWA DISTRICT

Each candidate will require the following:-

- *Winged cockroach lablled R*
- *Tick labelled N*
- *Soldier termite labelled P*
- *Adult housefly labelled Q*
- *10ml 20 volume hydrogen peroxide*
- *Pestle and mortar*
- *Spatula preferably a wooden one*
- *Scalpel*
- *Ruler caliberated in centimeters*
- *A medium size irish potato tubers labelled L*
- *Measuring cylinder (to measure up to 4mls)*
- *2 boiling tubes*
- *3 test-tubes*
- *Means of labeling (two each)*
- *A maize seedling with opened coleoptile*
- *Green leaves and should also have remains of grain labelled K seedlings grown in the sand on trays in plastic containers give good specimens*
- *Distilled water*
- *Iodine solution*
- *Benedicts solution*
- *Means of heating*

1. *You are provided with specimens labelled N, P, Q and R. Using the following characteristics and in the order given only*

   - *Number of legs*
   - *Presence of wings*
   - *Number of wings*

   a) Construct a three –step dichotomous key. Use the given letters for identification

   (Specific names not required)

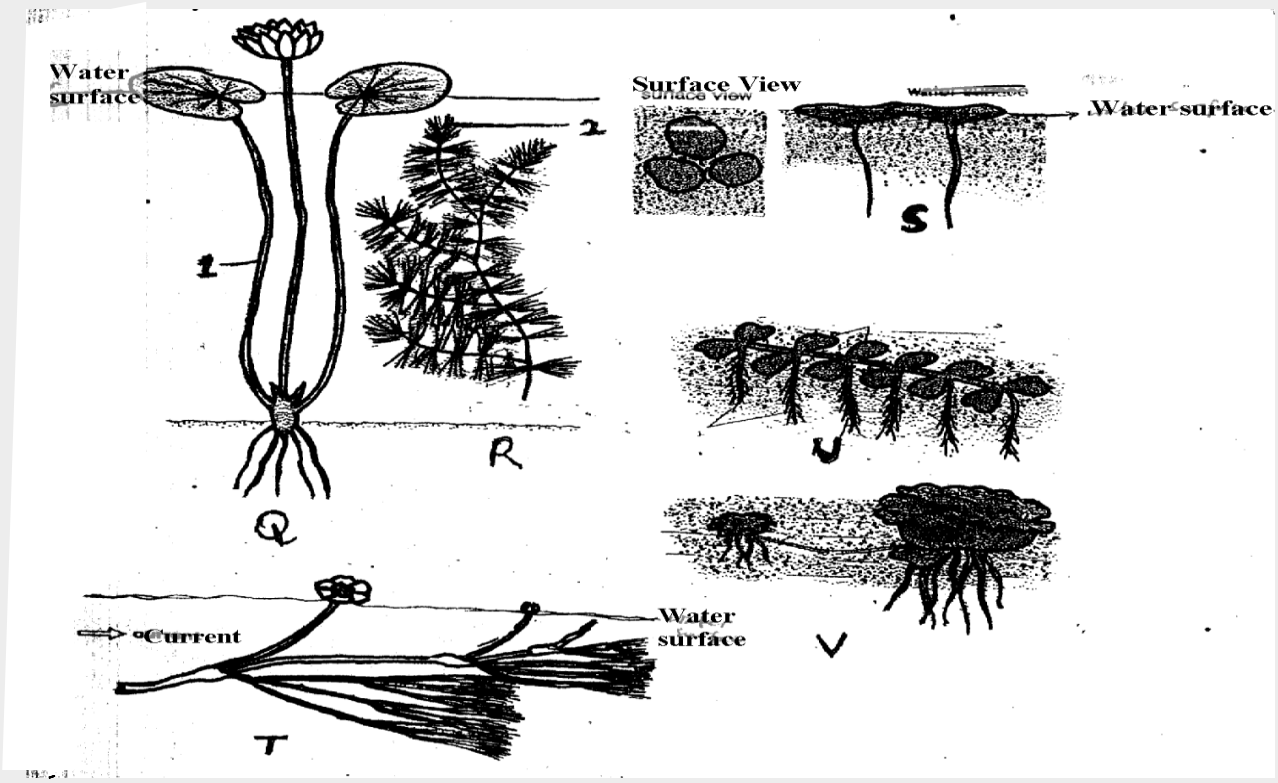
   b) i) Using observable features only, state the phylum to which specimen R belongs

   ii) Give three reasons for your answer in (b) (i) above

   c) i) Using observable features only, classify specimen N in its class

   ii) Give four reasons for your answer in (c) (i)

2. *Study the photographs of some hydrophytes shown below. They show various adaptations they have to overcome problems they are exposed to due to the nature of their habitats*



i) What are hydrophytes?
ii) Name the structures of plants labelled 1 and 2
iii) State two problems which hydrophytes are faced with in their habitat
iv) With reference to the photographs, how are the hydrophytes adapted to solve each of the problems you have stated in part 2 (iii) above?
v) State two internal adaptive features of the plants not shown in the photographs above that enables them to live in their habitat
vi) What type of hydrophytes do the following plants represent?
R ..... S.....

3. *You are provided with a specimen labelled L and hydrogen peroxide*
a) Cut two equal cubes whose sides are about 1cm from specimen L. Place one of the cubes into a boiling tube labelled A. Crush the other cube using pestle and mortar. Place the crushed material in another boiling tube labelled B.
To each boiling tube add 4ml of hydrogen peroxide
i) Record your observation
ii) Account for the result in (a) (i) above
iii) Write an equation for the break down of hydrogen peroxide

b) You are provided with a specimen labelled K. Separate the roots and leaves from the remains of the grain. Crush the roots, leaves and the remains of the grain separately. To each crushed materials add 1ml of water. Put the extract from the materials into separate test tubes and label them using the reagents provided. Test for the food substances in each of the extracts. Record the procedure, observation and conclusions in the table below:-

c) Account for the results obtained in (b) above
i) Roots
ii) Remains of grains

iii) Leaves

CONFIDENTIAL INFORMATION TO SCHOOLS AND PRACTICALS

MUMIAS DISTRICT

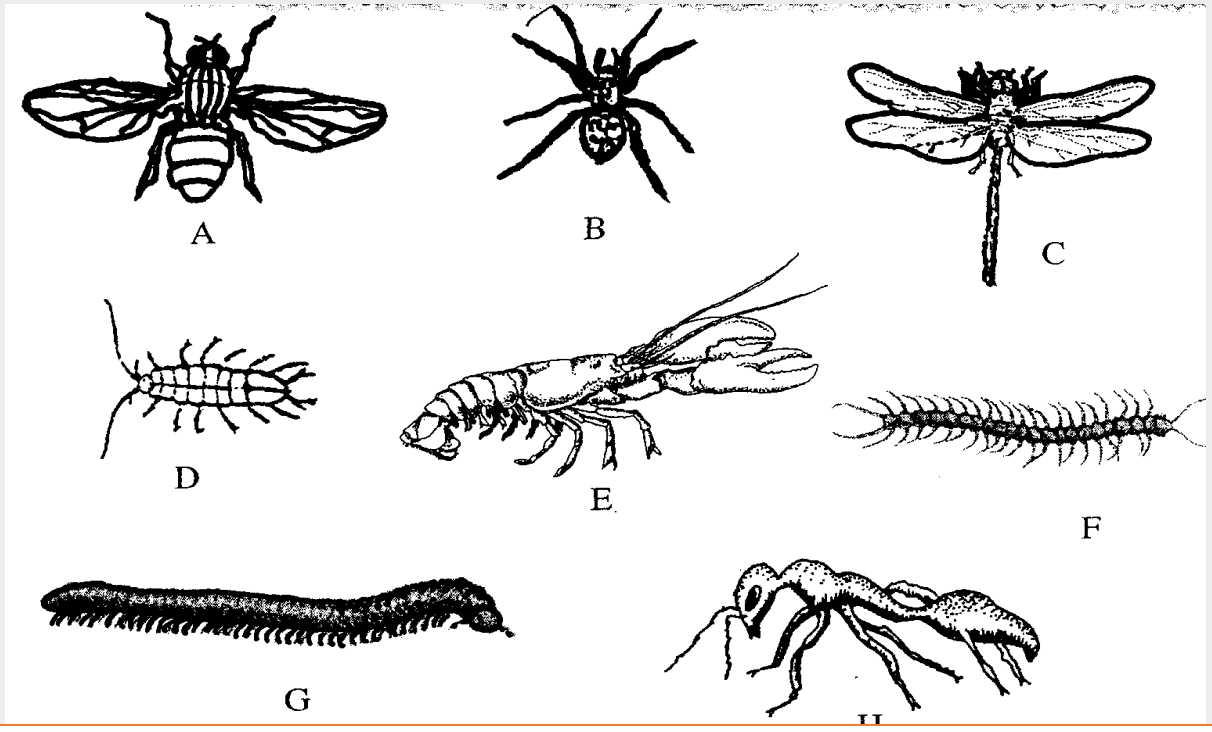
Requirements :-

- *Unripe pawpaw fruits (one pawpaw- ten students)*
- *Beaker (4)*
- *Razor /scalpel*
- *Ruler*
- *Solution G – distilled water*
- *Solution H – salt solution of different concentration namely 10%, 20%, 60%*
- *Labels*

1. *You are provided with specimen D and two solution G and H.*
   Cut five longitudinal strips of the specimen D peelings of approximately 0.5cm width, 0.5cm breadth and 5cm length.
   Place one strip in a beaker having solution G.
   Place other strips in separate beakers containing different concentration of solution H as indicated in the table below:

Beaker	*Solution*
1	*Solution G*
2	*10% solution H*
3	*20% solution H*
4	*60% solution H*

   Leave the set-up for 30minutes
   (i) Record your observations in the table below:
   (b) Account for the observation in trips 1, 2 and 4
   (c) Suggest the identity of solution G and H
2. *During a biology lesson, students made drawings of invertebrates shown below. Use the dichotomous key provided below to identify the organisms;*



1. a. Animal with wings ……go to 2

b. Animal without wings ……go to 3

2. a. With one pair of wings……Housefly

b. With pairs of wings ……Dragonfly

3. a. With three pairs of legs ……Ant

b. With more than three pairs of legs……go to 4

4. a. With four pairs of legs ……Spider

b. With more than four pairs of legs ……go to 5

5. a. With two pairs of antennae ……go to 6

b. With one pair of antennae……go to 7

6. a. With six pairs of legs……Water slater

b. With ten pairs of legs ……Fresh water shrimp

7. a. With a body ……millipede

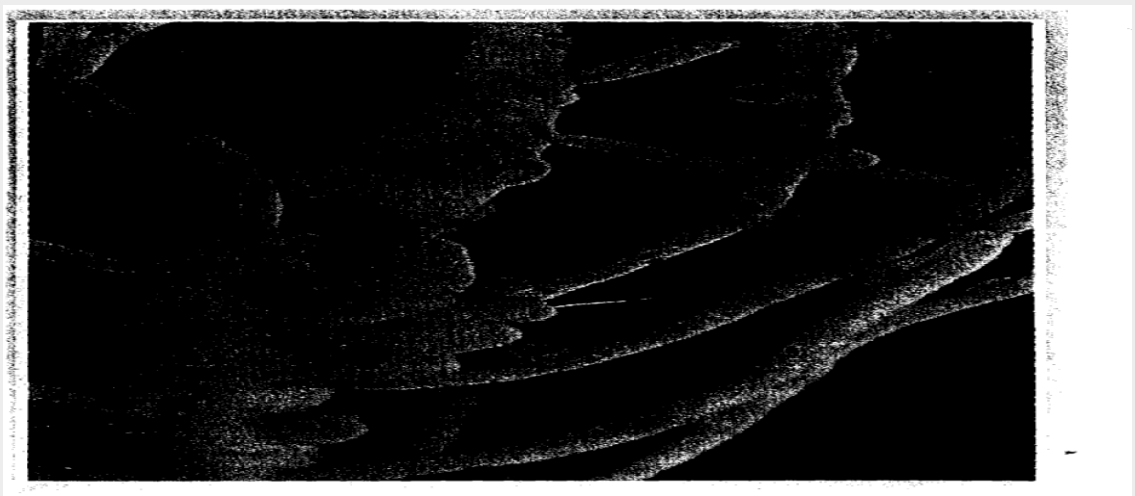
b. With a dorso-ventrally flattened body……Centipede

(a) Complete the steps 2(b) and 7(b) by filling in the key above

(b) Complete the table to identify the organisms:

(c) State the classes of specimens B, C, E and G

3. The photograph Z below is apart of a plant. Examine it



(a) Label any three parts of the plant part in photograph Z

(b) Name the type of organisms that is associated with this part of the plant

(c) Photograph Z was taken from a special type of plant. What is the name of this group of plants?

(d) Photograph Z exhibits a certain phenomenon;

(i) Name the phenomenon

(ii) State the significance of this phenomenon named in d(i) above

(iii) What is the product of this phenomenon?

(iv) Name two organisms that covert the product of the phenomenon in d(i) above into the raw material

CONFIDENTIAL INFORMATION TO SCHOOLS AND PRACTICALS

KISUMU WEST DISTRICT

Each candidate should have:-

- *Starch suspension labelled <u>Liquid X</u>*
- *Iodine solution*
- *Benedict's solution*
- *2M hydrochloric acid (1ml)*
- *2 Droppers*
- *Measuring cylinder (10ml size)*
- *Means of heating/Bunsen burner*
- *5 test-tubes*
- *Water in a small beaker*
- *Thermometer*
- *Test-tube holder*
- *3 boiling tubes*
- *Tripod stand and gauze*
- *3 labels*
- *White tile*
- *Water bath*
- *Diastase/ amylase enzyme (0.5g per student)*

<u>N/B</u>: -Liquid X is prepared by dissolving 5g of soluble starch in 50ml of distilled water. Thorough stirring is required whenever it is being used.

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.

(b) Pour 2ml of liquid X into a test-tube. Add equal amounts of Benedict's solution and boil the mixture. Record your observation

(c) Label three boiling tubes as set-ups A, B, and C. Place 3ml 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 1ml of water to it and boil for four minutes. Add it to set-up B and shake.*
- *To set –up C, add the third portion of substance Q. Add 8 drops of 2M hydrochloric acid and shake.*

Place the three set-ups in a warm water bath maintained at 37°C for 40minutes.

Cool the set-ups by dipping the boiling tubes in cold water

Place 2ml of the contents of each set-up into three separate test tubes. Add equal amount of Benedict's solution to each of the three test-tubes and boil.

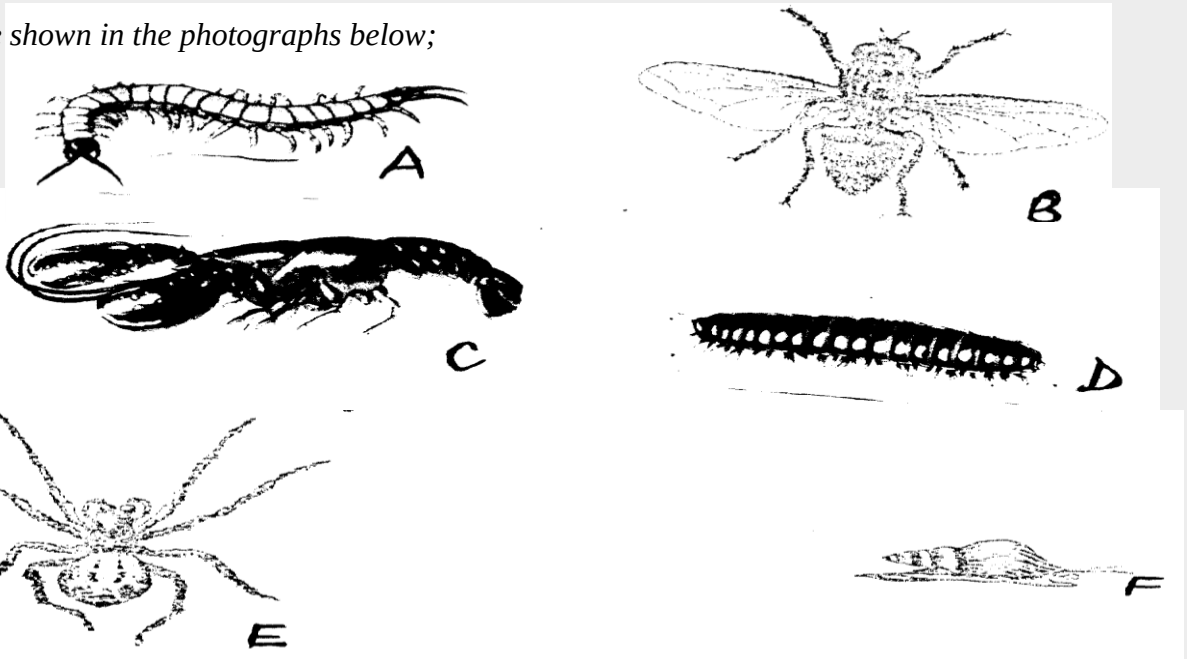
Record your observations :-

(d) Account for your observations in the set-ups:-

(e) Give the most likely identity of substance Q

(f) Why was the water bath maintained at 37°C

2. *During a visit to a museum, students were shown some animals on display. Six of the animals are shown in the photographs below;*



(a) Using observable features only, classify the animals, A, B and E into their respective classes. Give a reason for your answer in each case

(b) State one morphological difference between C and E

(c) The dichotomous key constructed below can be used to identify some of the animals viewed in the museum:-

1. (a) Has jointed legs .....go to 2

(b) Lacks jointed legs .....go to 3

2. (a) Has five or less pairs of legs ..... go to 4

(b) Has more than five pairs of legs ..... go t o 5

3. (a) Has bilateral symmetry.....EUNICE

(b) Has radial symmetry.....LUDIA

4. (a) Has five pairs of legs .....CANCER

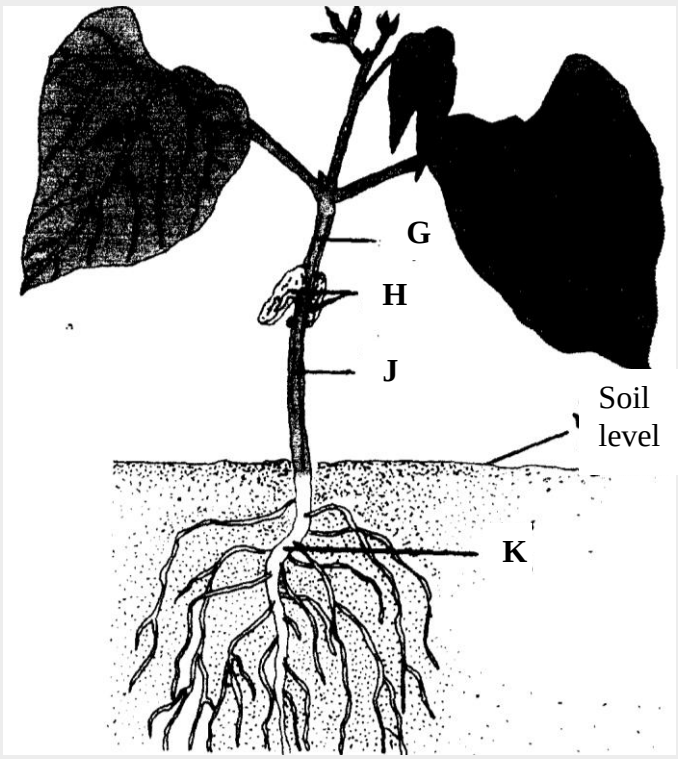
(b) Has four pairs of legs .....LACTRODECTUS

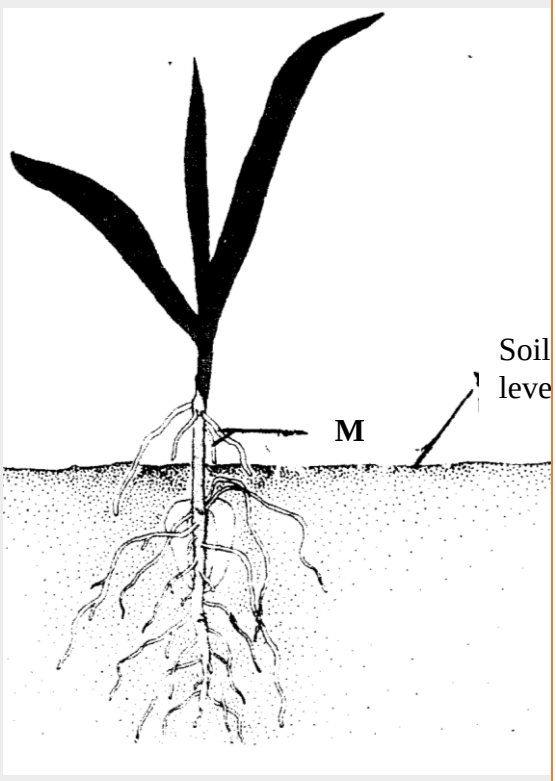
5. (a) Has I pair of legs per body segment .....SCOLOPENDRA

(b) Has 2 pairs of legs per body segment .....SIGMORIA

Use the dichotomous key above to identify animals labelled C, D and E. In each case show in sequence the steps followed (e.g. 1b, 2b, 3a e.t.c.) to arrive at the identity of each animal

3. Below are photographs I and II of young plants.





PHOTOGRAPH I *PHOTOGRAPH II*

(a) With a reason in each case, name the class to which the plants belong:

(i) Plant in photograph I .....

Reason.....

(ii) Plant in photograph II .....

Reason.....

(b) Identify the parts labelled G, J and M

(c) State two functions of the part labelled H

(d) (i) Name the swellings that would be developed in the roots of the plant in photograph I

later in its life

(ii) Which organism would be found in the swellings in (d)(i) above?

(e) (i) State the type of germination exhibited by the plant in photograph II

(ii) Give a reason for your answer in (e) (i) above

TRANS NZOIA WEST DISTRICT

Requirements for each candidate:

- *L_1- solution of egg albumen – 20ml*
- *L_2 – solution of starch and glucose – 20ml*
- *Visking tubing (10cm long)*
- *Thread*
- *250ml beaker*
- *Stirring rod*
- *Iodine solution*
- *Benedicts solution*
- *Source of heat*
- *4-test tubes*
- *1-boiling tube*
- *Test-tube holder*
- *Test-tube rack*

1. *You are provided with liquids labeled L_1, and L_2 and a piece of visking tubing. Spare about 10ml of each of the liquids for part (a) of this question*

   Using a piece of thread, tightly tie one end using the visking tubing

   Open the other end of the visking tubing and half fill it with liquid L_1. Tightly tie this end. Ensure there is no leakage at both ends. Immerse the tubing in a beaker containing liquid L_2

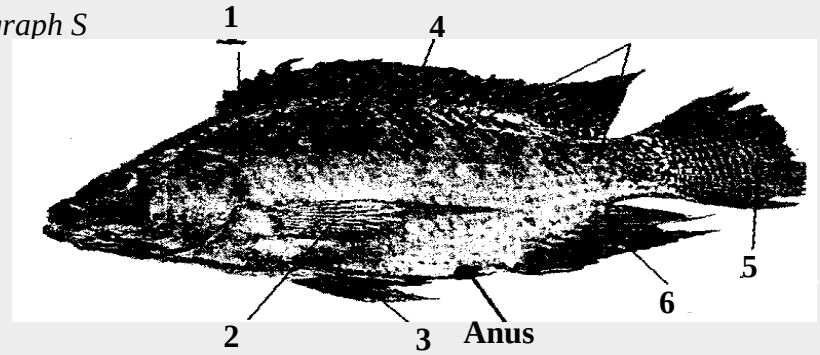
   a) Using the Iodine and the benedict's solutions provided, test for the food substances in liquid L_1 and L_2. Record your observations in the table below :-

   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 L_2

   b) Using the same reagents, test for food substances in liquid L_1 in the visking tubing. Record your observations in the table below:

   c) Account for the results obtained after carrying out tests on liquid L_1 before and after immersion into liquid L_2

2. *Below is photograph S*



a) i) Name the class to which the organism in the photograph belongs:

ii) Give three observable reasons for your answer in (a) (i) above

b) State two functions of the part labeled 1

c) Name the fins on the specimen that:

i)Enable the specimen to balance, brake and change direction

ii) Prevent the fish from rolling and yawing

d) Measure in millimeters the length of the:

i) Photograph S from the tip of the mouth to the tip of the tail

Length…… mm

ii) Photograph S from anus to the tip of the tail.

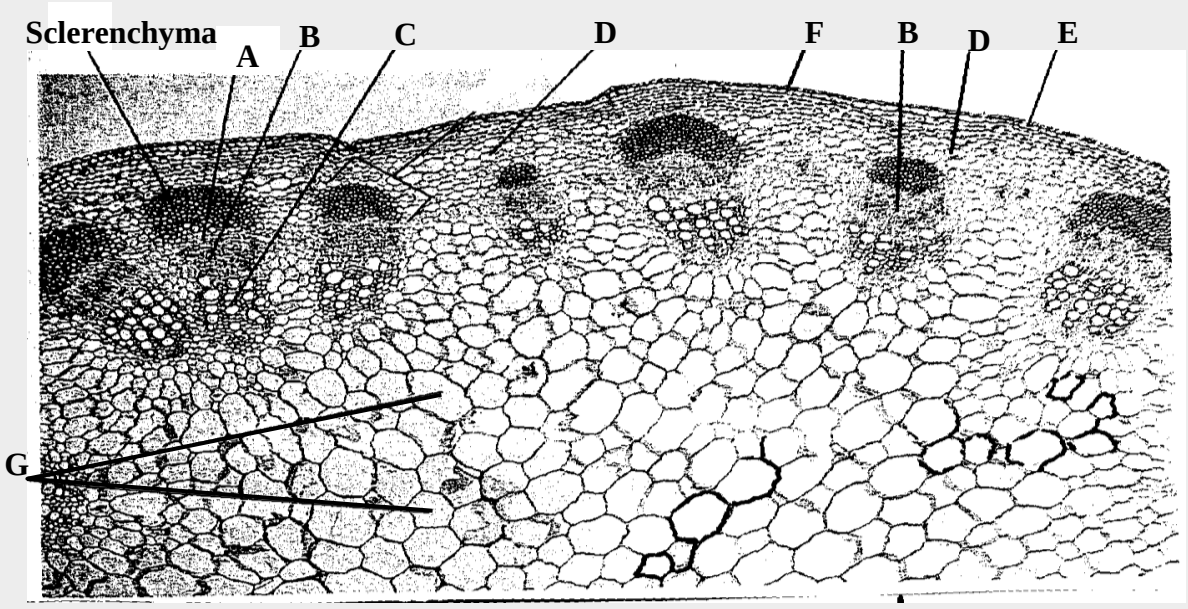
Length…… mm

iii) Using the measurements in d (i) and d (ii) above, calculate the tails power

iv) State the significance of tail power in specimen S

e) Other than structures in (c) above, state two observations of the animals in photograph S to locomotion in water

3. *Study the photomicrograph M which shows plants tissues*



a) Name the parts labeled A -G

b) State the function(s) of tissues labeled A, B, C

c) Name the cell types found in parts labeled D and G

d) How are sderenchyma cells adapted to their function?

e) Distinguish between the section above and the one from the root of the same plant

RACHUONYO DISTRICT

Each school will need 20g of yeast powder for every to candidates picked and sealed in polythene
papers and labeled substance K.
To schools - Substance K is to reach school on the morning of the examination packed
substance 'K' delivered to schools on the day of Biology examination

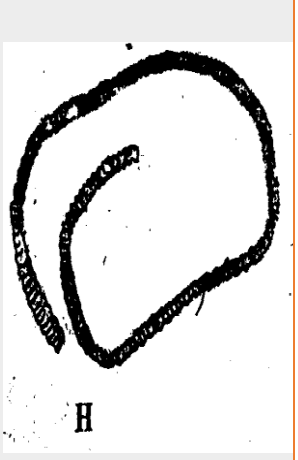
Each candidate will require the following:-

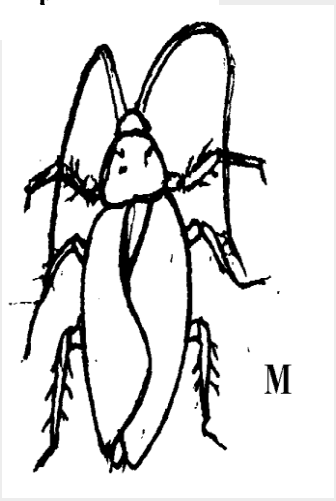
- *4 test-tubes with tightly fitting corks*
- *6ml of 10% glucose in a test tube*
- *3 labels per candidate*
- *6ml of distilled water in a test tube*
- *Source of heat*
- *2cm by 2cm liver piece*
- *Dilute hydrogen peroxide (20 volumes)*
- *About 2g of substance K*
- *Substance K to be provided by RAEC on the morning of examination day)*

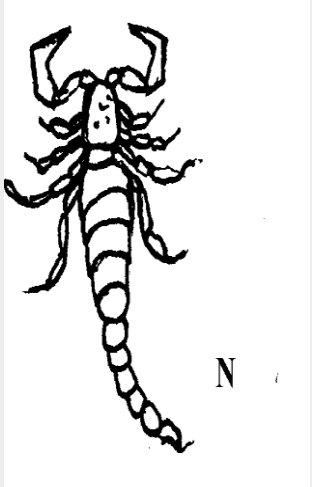
1. *During a visit to a museum, students were shown ten specimens of invertebrates on display.*

   The teacher provided a dichotomous key to enable them classify each specimen on display.

   Five of the specimens are shown in the photographs below:







DICHOTOMOUS KEY

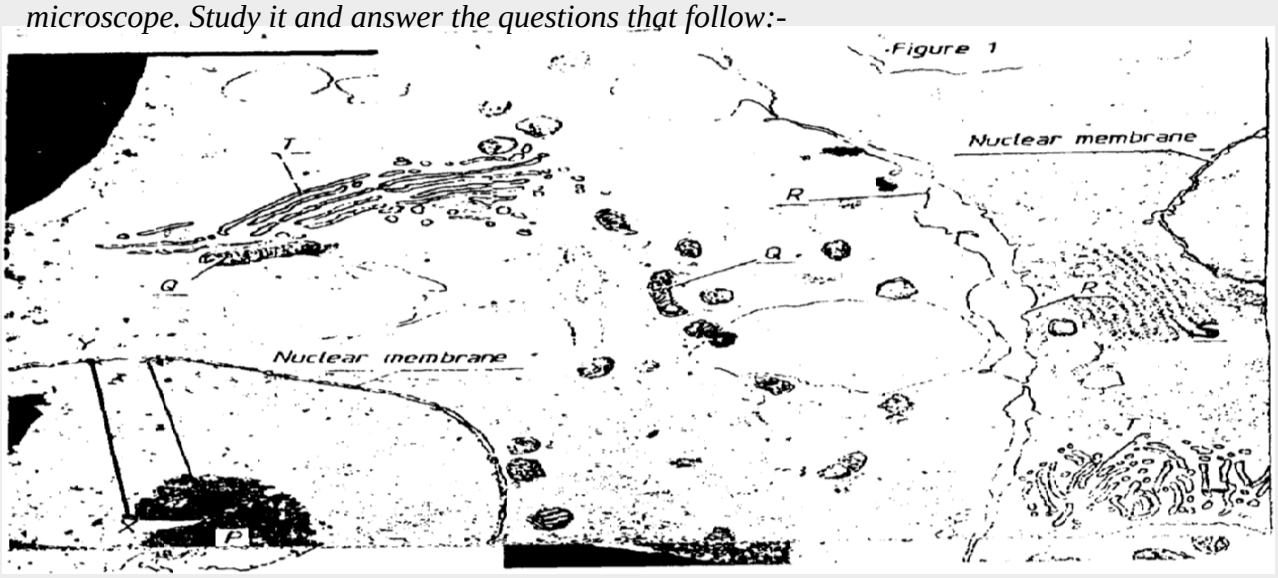
1. a. Animal with flattened body	*Go to 9*
b. Animal without flattened body	*Go to 2*
2. a. Animal with body in shell	*Mollusca*
b. Animal without shell	*Go to 3*
3. a. Animal with segmented body	*Go to 4*
b. Animal with body not segmented	*Nematoda*
4. a. Animal with jointed appendages	*Go to 6*
b. Animal without jointed appendages	*Go to 5*
5. a. Animal with long and cylindrical body	*Annelida*
b. Animal with short stout body	*Trematoda*
6. a. Animal with antennae	*Go to 7*
b. Animal without antennae	*Go to 8*
7. a. Animal with one pair of antennae	*Insecta*
b. Animal with more than one pair of antennae	*Crustacea*
8. a. Animal with pincer like mouth parts	*Arachnida*
b. Animal with sucking mouth parts	*Acarina*
9. a. animal with long ribbon like body	*Cestoda*
b. Animal with circular body	*Crinoidea*

(a) Use the dichotomous key to identify the taxonomic group of each of the five specimens in the photographs. In each case, show the sequence of steps e.g. 1a, 2b, 7b e.t.c. in the key that you followed to arrive at identity of each specimen

(b) State the phylum to which animal G belong

(c) Apart from jointed appendages, state 2 other distinguishing characteristics of the phylum named in B above

2. The photomicrograph below represents parts of 2 adjacent cells as seen under an electron microscope. Study it and answer the questions that follow:-



(a) Use the table below to name P, Q, R, S and T. For each organelle, state one function

(b) The magnification of the cells in this micrograph is x 10,000. Use a ruler to measure the radius of the nucleus between X and Y in millimeters. Calculate the actual radius of the nucleus before magnification in mm

Length……mm
Actual radius of nucleus

3. *You are provided with 10% glucose solution and substance K. place equal amounts of the glucose solution in test tubes labeled 1, 2 and 3. Divide the substance K into 3 equal portions. To one portion, add 2ml of water and boil, cool it down. Pour this mixture into test tube 1*

Add another portion of substance K to test-tube 2 and shake.

Put 2ml of distilled water in test tube 3. Close the 3 test-tubes tightly using well fitting corks, and allow the set-ups to stand for at least 20 minutes

(a) Record your observation: (i) Test tube 1
(ii) Test tube 2
(iii) Rest tube 3

(b) (i) Name the process being investigated in the experiment
(ii) Write down an equation for this process
(iii) In which organelle does the process take place

(c) (i) Suggest the identity of substance K
(ii) Account for the results in test-tube 1

(d) Cut a small piece of liver 2cm by 2cm. drop it into the test tube containing dilute hydrogen peroxide. Leave for 2 minutes

(i) State your observation
(ii) Account for your observations

KAKAMEGA NORTH DISTRICT

Each candidate to be provided with:

- *Scalpel blade*
- *A ripe tomato labelled specimen Q.*
- *A mortar and a pestle*
- *Filter paper,*
- *Means of heating*
- *DCPIP*
- *3 droppers*
- *50cm^3 beaker*
- *4 A freshly killed soldier termite labelled specimen R*
- *4 A freshly killed maize weevil labelled specimen. S*
- *4 A hand lens.*

1. *You are provided with specimen labelled Q. Examine it and;*

(a) (i) Name the part of a plant specimen Q is

(ii) Give a reason for your answer in (a)(i) above

(b) (i) Name the likely mode of dispersal of specimen Q

(ii) Give two reasons for your answer in (b)(i) above

(c) Make a transverse section through specimen Q to obtain two equal halves

(i) Draw and label one of the halves of specimen Q.

(ii) Crush one f the halves of specimen Q in a mortar using a pestle to obtain a paste. Gently decant the juice into a boiling tube.

d) Using the reagents provided test for the food substances present in the juice extracted.

Record your procedures, observations and conclusions in the table below.

Food substance	*Procedure*	*Observations*	*Conclusion*

2. *You are provided with specimens labelled R and S. Examine then;*

(a) (i) Name the phylum to which the specimen R and S belong

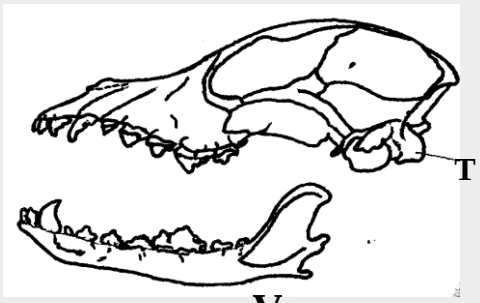
(ii) Give three reasons for your answer in (a)(i) above.

(b) (i) Name the class to which specimens R and S belong

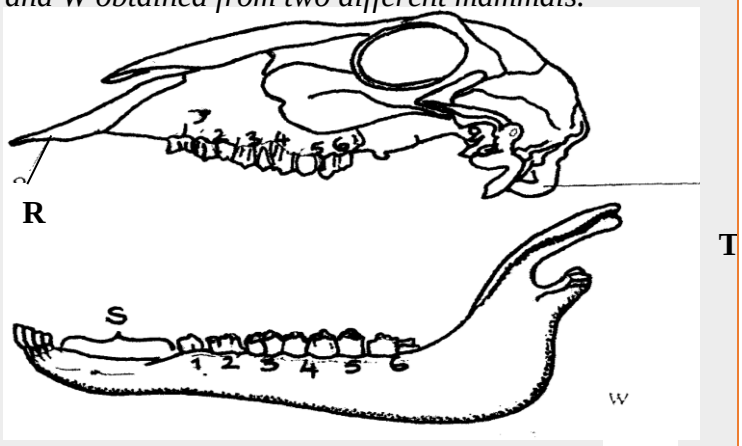
(ii) Give three reasons for your answer in (b)(i) above.

(b) State two observable differences between specimens R and S.

3. *The drawings below illustrate two skulls V and W obtained from two different mammals. Examine them.*



V



W

(a) State the mode of feeding of the organism from which each of the skulls was obtained. Give two reasons in each case.

(b) Label canine on drawing W and carnassial teeth on drawing V

(c) State the function of each of the following labelled parts on the drawing R & S

(d) Write down the dental formula of the organism from which skull W was obtained

(e) State four observable differences between the skulls V and W.

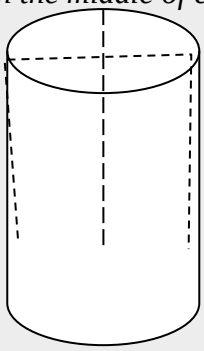
(f) (i) Name the part labelled T

(ii) Name the vertebra that articulates with the part labelled T.

CONFIDENTIAL INFORMATION TO SCHOOLS AND PRACTICALS

SOTIK DISTRICT- 1ST EXAM

1. *You are provided with two pieces of plant material labelled specimen Q. Using a scalpel cut two slits half way to obtain four flaps through the middle of each piece as shown in the diagram below:-*



Place one piece in the solution labelled M_1 and the other in the solution M_2 . Allow the set up to stand for 30minutes

(a) After 30minutes remove the pieces and press them gently between the fingers

(i) Record your observations M_1 M_2

(ii) Account for the observations in A above

(b) Examine the pieces

(i) Record other observations besides those made in (a) (i) above

(ii) Account for the observations in (b)(i) above

2. *You are provided with specimen labelled K*

(a) (i) Name the class to which the specimen belongs

(ii) Give three reasons for your answer in a (i) above

(b) What term is used to describe the shape of the specimen?

(c) Name and draw the fins on the specimen that;

(i) Enable the specimen to balance, brake and change direction

(ii) Prevent the fish from rolling and yawing

3. *You are provided with a specimen labelled*

(a) (i) What part of a plant is specimen T?

(ii) Give a reason for your answer in a(i) above

(b) (i) Cut a transverse section through specimen T (i) Draw and label one of the cut surfaces

(ii) State the magnification of your drawing

(iii) State the type of placentation of specimen T

(c) Name the agent of dispersal of specimen T

(d) State how specimen T is adapted to its mode of dispersal

BUTERE EAST DISTRICT

Each candidate should be provided with the following material/apparatus for the practical:-

- *Medium sized Irish potato (1 piece each) labeled Q.*
- *Mortar and pestle.*
- *Scalpel*
- *Distilled water*
- *Cotton thread (20 cm long).*
- *Visking tube 15 cm long.*
- *100 ml beaker.*
- *Stirring rod.*
- *Iodine solution.*
- *Means of timing.*
- *Photomicrographs labeled M and N.*
- *Transparent ruler graduated in mm*
- *Specimen K – Medium sized orange (should be moderately ripe and juicy)*
- *Test tubes (3 per candidate) in a test tube rack.*
- *DCPIP solution.*
- *Iodine solution.*
- *Benedicts solution.*
- *Means of heating water bath.*
- *Test tube holder.*
- *3 droppers.*
- *10 ml measuring cylinder.*

1. *You are provided with a specimen labeled Q. Slice off about 2 cm thick disc from the specimen. Peel it. Place the piece into a beaker and mash it into a paste using pestle and mortar. Add 20 ml of distilled water and stir. Tie one end of the transparent visking tubing provided. Decant the extract into the tubing and tie the other end tightly.*
   Ensure there is no leakage at both ends of tubing. Rinse the outside of tubing with water. Immerse the tubing with its contents in a 100 ml beaker containing iodine solution. Allow to stand for 20 minutes..
   a) Record your observations in the table below.
   (b) Account for the results obtained from (a) above.
   (c) What is the significance of the process being investigated to plants?
2. *Study the micrographs M and N show forms of a sexual reproduction in a certain group of organisms. Study them and answer questions that follow.*
   (a) (i) State the kingdom to which the two specimens belong.
   (ii) Give reason for your answer.
   (b) (i) What types of asexual reproduction are represented by the two specimens?
   (ii) State an example in each case of an organism that uses the type of reproduction named above.

(c) Consider the point marked X and Y. Measure the distances between the two in cm.

(i) Distance _____ cm

(ii) If the magnification of N is x60 of the actual specimen. What is the size of the actual specimen in micrometers? (Show your working)

What is the economic importance of the activities of M and N?

3. *You are provided with the specimen labeled K. Make a transverse section of the specimen*

(a) Draw and label the transverse section of the specimen.

(b) Which type of fruit is specimen K?

(ii) How is the specimen adapted for dispersal by the agent named in c (i) above?

(d) Squeeze the juice from the specimen K into a small beaker. Using the reagent provided to test for the food substances in the juice. Record the substances, procedures, observations and conclusions in the table below.

CONFIDENTIAL INFORMATION TO SCHOOLS AND PRACTICALS

TRANS MARA DISTRICT

Each student should be provided with:-

1. *Specimen P – fresh piece of mammalian lungs*
   Specimen Q – fresh piece of mammalian trachea
   - *Petri dishes –*
   - *A white tile*
   - *A scalpel blade*
   - *A hand lens*
   - *Ruler*

2. *Specimen R – fresh peas in a pod (Legume)*
   Specimen S – An orange/lemon (ripe)

1. *(a) You are provided with specimen P and Q which were obtained from the same animal. Examine them carefully and answer the questions that follow:*

(b) Which organ system were the specimen P and Q obtained from

(c) State the functions of P and Q in the organ system named in (b) above

(d) State four adaptations in each one of specimen P and Q to their functions

(e) Using a scalpel cut and draw a well labelled transverse section of specimen P

2. *You are provided with specimen labeled R and S. Use them to answer the questions that follow:*

(a) State the type of fruit labelled R and S

(b) (i) Draw a plan diagram of the longitudinally cut surface of specimen R

(ii) Work out your magnification

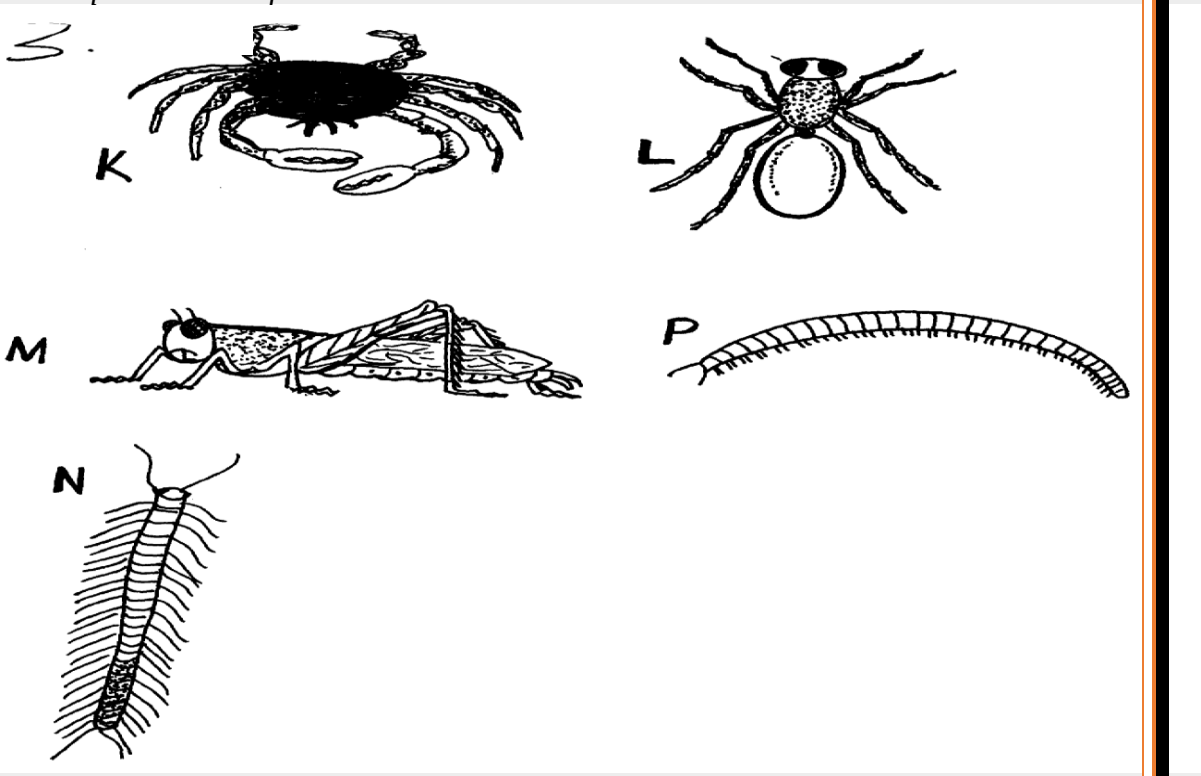
(iii) State the placentation of specimen R

(c) (i) State the method of dispersal of specimen R and S giving reasons for each case.

Fill your answers in the table below

(ii) Give one advantage of the method of dispersal of specimen S and one disadvantage of dispersal of specimen R.

3. *You are provided with photographs of specimen K, L, M, N and P. using observable features only, answer the questions that follow:*



(a) (i) State the phylum of the organisms

(ii) Give two reasons for your answer in (a) (i) above

(b) With reasons give the class of :

(i) Specimen K

Reason

(ii) Specimen N .

Reason

(c) (i) State two ways by which specimen M is adapted to locomotion

(ii) Identify the type of growth that occurs in members of specimen M

(iii) Name the hormone responsible for metamorphosis in specimen M

(d) State two economic importance of specimen P

CONFIDENTIAL INFORMATION TO SCHOOLS AND PRACTICALS

SOTIK DISTRICT

1. *Each candidate should have one fruit of;*
   - *Black jack labeled P*
   - *Tomato (ripe one – money maker variety) labeled Q*
     - *Bean/pea (mature one) labelled R*
   - *Sonchus /fleabane/dandelion labeled S*

2. *Each candidate should have access to :-*
   - *DCPIP solution*
   - *Ethanol*
   - *Benedict's solution*
   - *Iodine solution*
   - *Hot water bath*
   - *Clean water*

   N/B Use clean droppers where applicable to minimize contamination of reagents.

3. *Each candidate should be provided with;*

   (i) 4 test-tubes in a test tube rack.

   (ii) Razor blade (or they can be asked to bring theirs).

1. *You are provided with specimens labeled P, Q, R and S*

   (a) State the type of fruits represented by each of the specimens

   (b) Explain how specimens R and S are adapted to their agents of dispersal

   (c) Cut the specimen Q transversely in the middle. Draw a well labeled diagram of the face of the cut surface of one of the halves

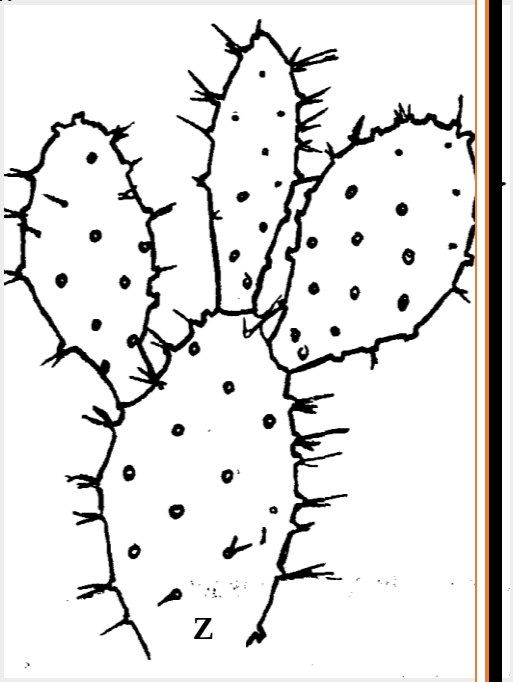
   (d) State the placentation of specimen Q

2. *(a) Wash of the halves of specimen Q and place it in a mortar and grind it using the pestle to obtain its juice. Then add clean water enough to fill a test tube and shake. Then decant the juice into a clean test tube. Using the apparatus and the chemicals provided subject*

   (b) Explain how digestions of the components of the food sample are digested in the ileum of a mammal

   (c) What is the importance of specimen Q in the human diet?

3. *The photographs W and Z below are of plants obtained from different habitats*



(a) Suggest the possible habitat of specimen W

(b) (i) Name the structure labeled Y in specimen W

(ii) State the function of the structure named in (b) (i) above

CHAMPIONS K.C.S.E REVISION SERIES EXECUTIVE COORDINATORS/EXAMINERS/BIOLOGY