BIOLOGY KCSE TRIALS

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

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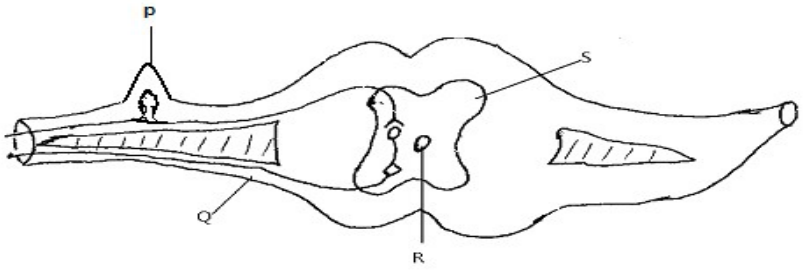
231/1/2/3 - BIOLOGY - Paper 1/2/3

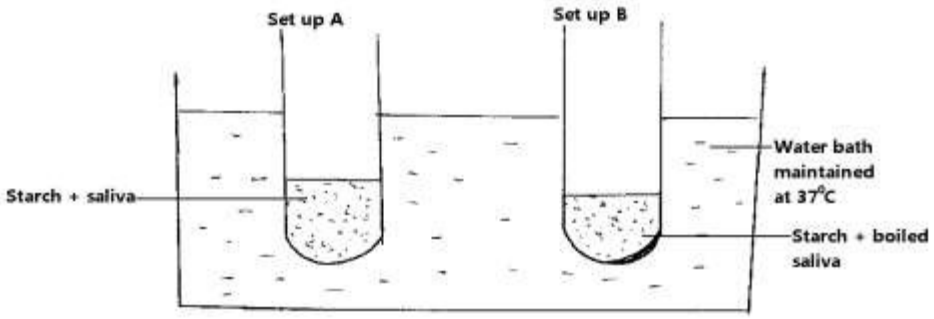
PREDICTION 1-11 2019

KCSE PREDICTION 1 2019 PAPER 1

1. **Name** the organelles that would be most likely found in large numbers in cells that perform the functions below. (2mks)
   (a) A cell in the ileum that actively takes in glucose.
   (b) A cell in the liver that breaks down foreign bodies.
2. A doctor added a few drops of anti B-serum to two samples of blood in a blood test. No agglutination occurred. **Name** the blood groups of the blood samples. (2mks)
3. **State** the significance of metamorphosis in insects. (3mks)
4. **State three** structural differences between muscles alimentary canal and biceps muscles.(3mks)
5. The dental formula of a certain animal is $I\frac{0}{3}$ $C\frac{0}{1}$ $P\frac{3}{2}$ $M\frac{3}{3}$
   (i) **Suggest** the mode of feeding of the animal (1mk)
   (ii) Give a reason for your answer in part (i) above (1mk)
6. In an accident a victim suffered damage of his internal organs, consequently he started having excess glucose in his blood.
   (a) **Which** organ was damaged? (1mk)
   (b) **Give** a reason for your answer (1mk)
7. **Name two** structures in plants where meiosis occurs (2mks) 8. The diagram below represents a reflex arc in human



   (a) Name the parts labelled **P** and **S** (2mks)
   (b) **State** the function of the parts labelled **Q** (1mk)
   (c) Part **R** contains some type of fluid. Name the fluid. (1mk)
9. **State three** roles of diffusion in plants (3mks)
10. During the first phase of respiration, a glucose molecule is broken down into pyruvic acid and a small amount of energy is produced.
    (a) **Name** the process described above. (1mk)
    (b) **State** where the process you have name in (a) above takes place in a cell. (1mk)
11. The energy used by a hawk for flying is obtained indirectly from the sun. **Explain**.
12. The flippers of whales and fins of the fish adapt these organisms to aquatic habitats.
    (a) **Name** the evolutionary process that may have given rise to such structures. (1mk)
    (b) **What** name is given to such structures? (1mk)
13. In an experiment to investigate an aspect of digestion, two test tubes A and B were set up as shown in the diagram below



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

(a) **What** was the aim of the experiment? (1mk)

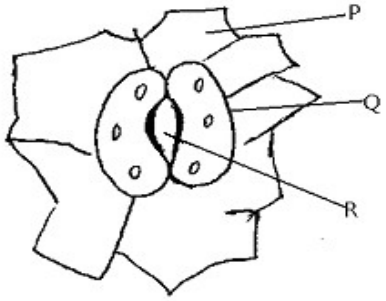
(b) **What** results were expected in test tubes **A** and **B** (2mks)

(c) Why was the set-up maintained at 37^0C. (1mk)

14. **Explain** how drooping of leaves in a hot sunny day is advantageous to a plant. (2mks)

15. **State two** classes of the phylum arthropoda in which the body is divided into cephalothorax and abdomen. (2mks) 16. (a) **What** is co-dominance? (1mk)

(b) **Name two** disorders in human blood that are caused by gene mutation. (2mks) 17. **Describe** what happens during the dark stage of photosynthesis (3mks) 18. The diagram below represents a structure found in plants.



(a) Name the parts labelled **P** and **R** (2mks)

(b) **State** how part **Q** is adapted to its function (2mks)

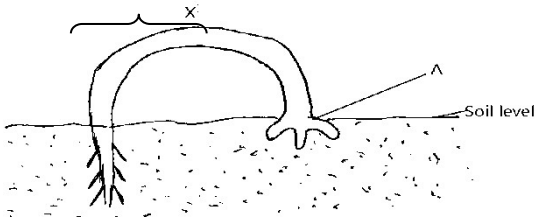
19. A certain species of flowering plant relies entirely on sexual reproduction for propagation. The chromosome number of the cell in the ovarian wall is 16.

State the chromosome number of

(a) The pollen tube nucleus (1mk)

(b) A cell of the endosperm (1mk)

20. The diagram below represents germination of a certain seed.



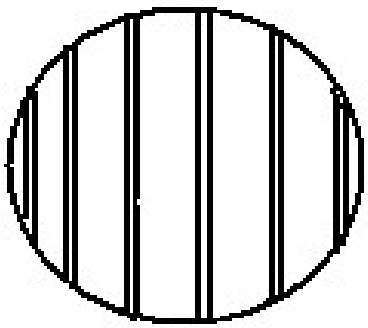
(a) **Name** the type of germination exhibited by the seedling above (1mk)

(b) **Name** the region labeled X (1mk)

(c) **Explain** how the part labeled X of the seedling straightens after exposure to sunlight.

(3mks)

21. A student estimating the cell size of an onion epidermal cell observed the following on the microscope field of view using a transparent ruler.



The student counted 20 cells a cross the field of view.
Calculate the size of the cell in micrometer. Show the working clearly. (3mks)

22. **Name** the components of the blood that do not enter the renal tubule in mammals. (2mks)
23. **Give three** reasons as to why biological control is preferred to chemical control in the control of pests and parasites. (3mks)
24. A person fell from the third floor of a storey building and had part of his brain damaged. **Indicate** the part of the brain damaged if the person suffers from the following.
    (i) Loss of memory and speech (1mk)
    (ii) Inability to regulate body temperature (1mk)
    (iii) Irregular heartbeat and breathing (1mk)
    (iv) Inability to maintain proper body balance and posture (1mk)
25. (a) **Name** the microorganism found in the root nodules of legumes (1mk)
(b) **State** the association of the micro-organisms named in (a) above (1mk)
(c) **What** is the role of the microorganism you named in (a) above. (1mk)
26. **Name** the causative agent of cholera (1mk)
27. **State two** ways in which the composition of blood in the umbilical artery differ from that in umbilical vein (2mks)
28. **State three** ways in which the tracheole system is adapted to its function. (3mks)
29. **Give** a reason for each of the following.
    (a) Long feathery stigma in a flower (1mk)
    (b) Presence of nectaries in some flowers (1mk)
30. For a leaf to be efficient for photosynthesis, it has to be broad and thin. **Explain**. (2mks)

PAPER 2 SECTION A (40MKS)

Answer ALL the questions in this section in the spaces provided.

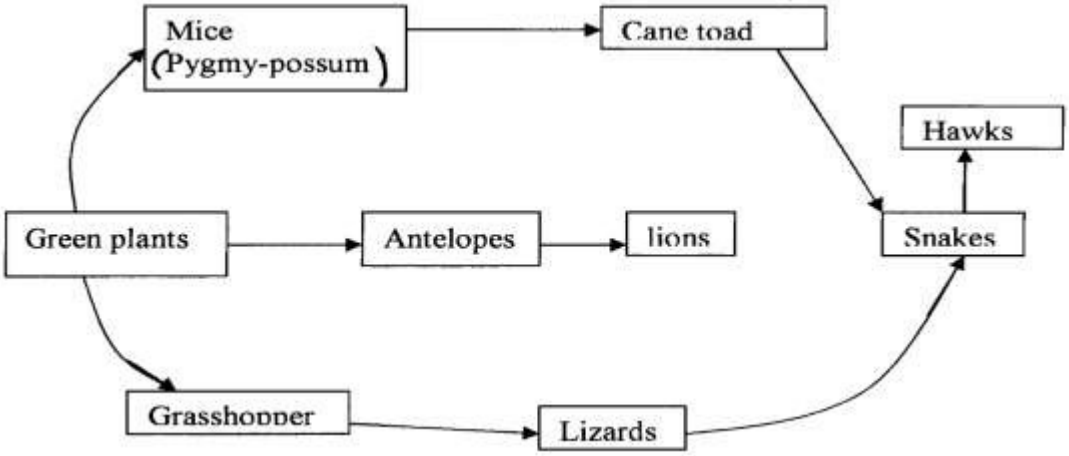
1. (a) Define

i) Osmosis (lmk) ii) Haemolysis (lmk) (b) State the role of active transport in plants. (2mks)

(c) Why is oxygen important in the process of active transport? (lmk)

(d) State three properties of the cell membrane (3mks)

2. The diagram below represents a food web in a terrestrial ecosystem.



(a) Which organism has the fewest number of preys (lmk)

(b) Construct food chains with snakes as tertiary consumers (2mks)

(c) State the trophic level occupied by hawks in the food chains constructed in b) above(lmk)

(d) Describe how capture — recapture method can be used in estimating the population of fishes in a lake. (4mks)

3. (a) Differentiate between the mode of fertilization in higher plants and in mammals (2mks)

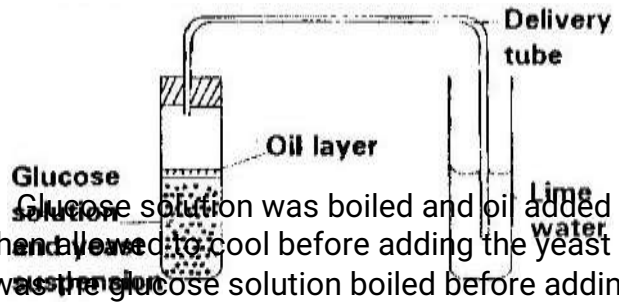
(b) Explain the role of the following hormones in the female menstrual cycle

(i) Oestrogen (2mks)

(ii) Luternizing hormone (2mks)

(c) Give two functions of the placenta during pregnancy (2mks)

4. The diagram below shows a set up that was used to demonstrate fermentation.



Glucose solution was boiled and oil added on top of it. The glucose solution was then allowed to cool before adding the yeast suspension.

a) Why was the glucose solution boiled before adding the yeast suspension? (1mk)

b) What was the importance of cooling the glucose solution before adding the yeast suspension? (1mk) c) What was the use of the oil in the experiment? (1mk)

d) What observation would be made in test tube B at the end of the experiment (1mk) e) Suggest a control for this experiment (1mk)

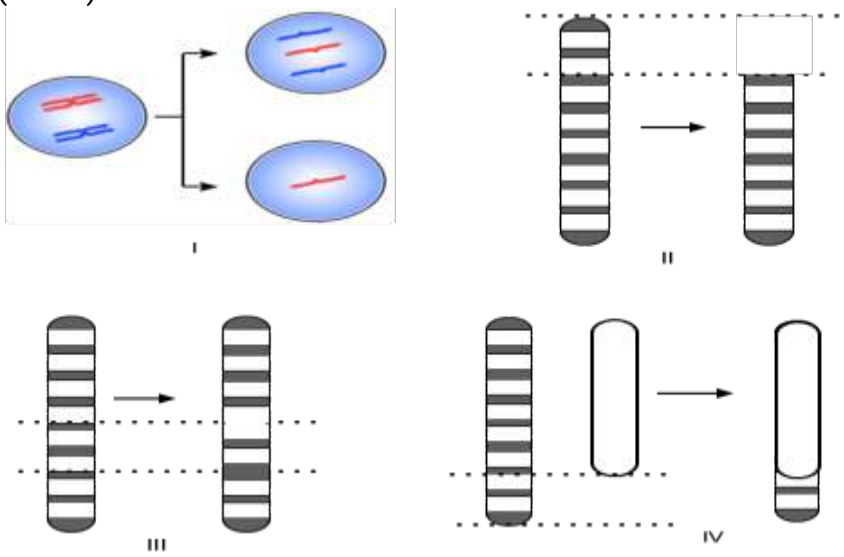
5. Hemophilia or bleeder's disease is a condition in which blood takes a longer time than usual to clot. This is due to lack of a certain blood protein. The gene for hemophilia is recessive to the gene for normal clotting factor and is found on the X-chromosome.

(a) Explain why there are only female carriers for hemophilia and no male carriers for traits. (1mark)

(b) A carrier female for hemophilia trait married a normal male. Work out the possible genotype of the children. Let letter **H** represent the normal gene, and let h represents

the gene for hemophilia.
(4marks)

(c) Identify the types of chromosome mutations I, II and IV.
(3mks)



I ……

II ……

IV ……

SECTION B Answer question 6 (Compulsory) and either question 7 or 8

6. Two sets of a pea seeds were germinated, set A was placed in normal daylight conditions in the laboratory while set B was placed in a dark cupboard. Starting a few days later the shoots lengths were measured twice daily and their mean lengths recorded as shown in the table below.

Time in hours	0	12	24	36	48	60	72	84
Set A length (mm)	12	14	20	23	28	31	47	54
Set B length (mm)	17	23	28	35	48	62	80	94

a) Using suitable scale draw the graphs of the mean lengths in set A and B against time. (8 marks)

b) From the graph state the mean shoot length of each set of seedling at the 66th hour (2mks)

c) Account for the difference of curve B and A (3 mks)

d) Explain what would happen to set up B if it were allowed to continue to grow under conditions of darkness (4mks)

e) State three external conditions which should be constant for both set ups (3mks)

7.

a) How are xerophytes adapted to their habitat? 10mks)

b) Discuss application of genetics in health care today. (10mks)

8. Outline and explain the various functions of the liver in mammals.
(20mks)

PAPER 3

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. (lmk)

(b) Pour 2ml of liquid **X** into a test-tube. Add equal amounts of Benedict's solution boil the mixture. Record your observation (lmk)

(c) Label three boiling tubes as set-ups **A**, **B,** and **C**. Place 3m1of liquid X into each of the setups.
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 30minutes.
Cool the set-ups by dipping the boiling tubes in cold water
Place 2m1 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 (3mks)
Set-up **A**
Set-up **B**
Set-up **C**

(d) Account for your observations in the set-up (3mks)
Set-up **A**
Set-up **B**
Set-up **C**

(e) Give the most likely identity of substance **Q** (1mk)

(f) Why was the water bath maintained at 37°C (lmk)

(g) What is the fate of the product of set up A in an organism? (2mks)

2. Below are photographs of a variety of invertebrates. Examine them and answer the questions that follow.

a. Complete the dichotomous key given below. (5mks)
1a. Animal with three pairs of legs……go to 2
b. _____.....go to 5

2a. Animal with wings……go to 3 b. Animal without wings……..Hymenoptera 3a. Animal with one pair of wings……Diptera

b. _____.....go to 4

4a. Fore wings hard……Orthoptera b. Fore wings membranous……Odonata

5a. _____.....go to 6

b. Animal with more than four pairs of walking legs……go to 7

6a. _____.....Crustacea

b. Animal without antennae……..Arachnida

7a. _____……..Chilopoda

b. Animal with two pairs of legs in each body segment ……Diplopoda

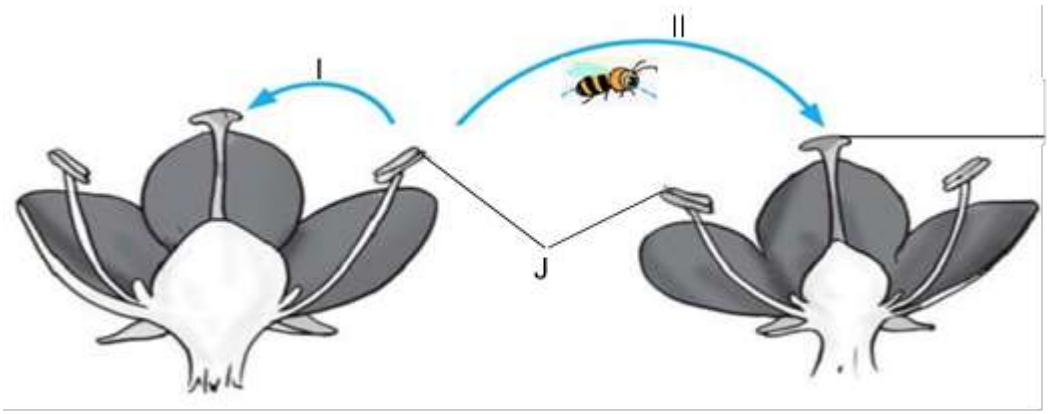
b. Use the dichotomous key to identify the specimen in the photographs above. (8mks)

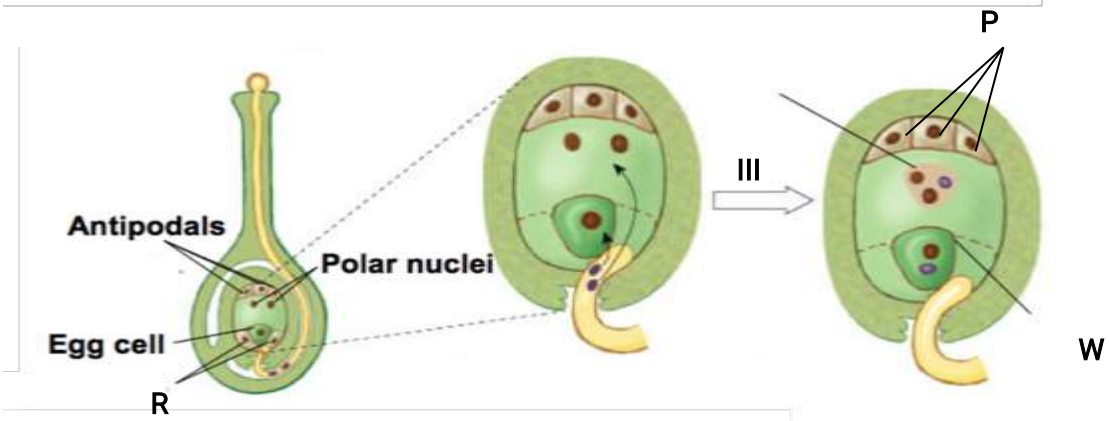
Specimen	Steps followed	Identity
K1		
K2		
K3		
K4		
K5		
K6		
K7		
K8		

3. All members of plant division Spermatophyta exhibit alternation of generation. The photographs below show stages in the growth and development of a spermatophyte.

a. i. Processes I, II and III. (3mks)

ii. Structures K, P, R and W. (4mks) iii. The cell division process that occurs in structures J. (1mk) iv. The products of the process named in (iii) above. (1mk)

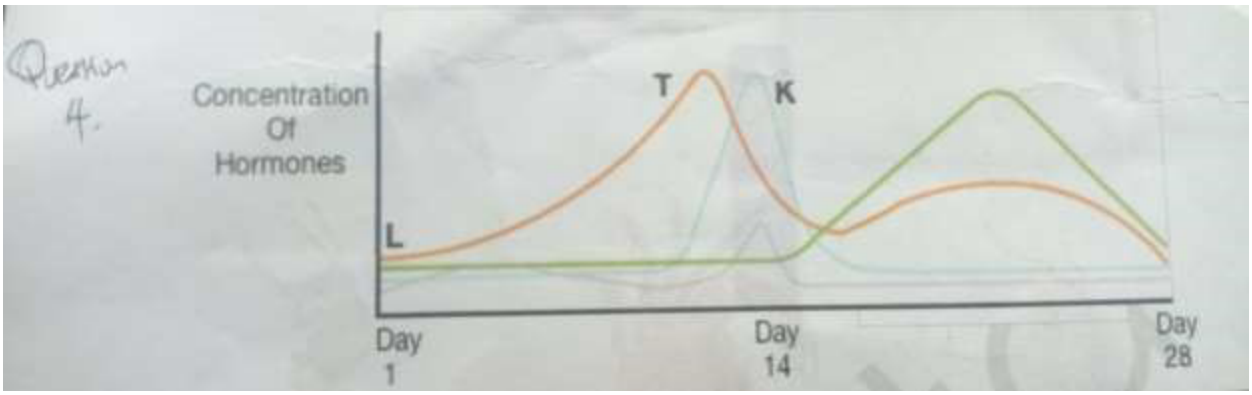




b. Explain the role of the following in promoting process II in the flowering plants.
i. Petals (2mks) ii.
Filaments. (2mks)
c. The photographs above represents one of the phases in alternation of generations in spermatophytes. Name the phase. (1mk)

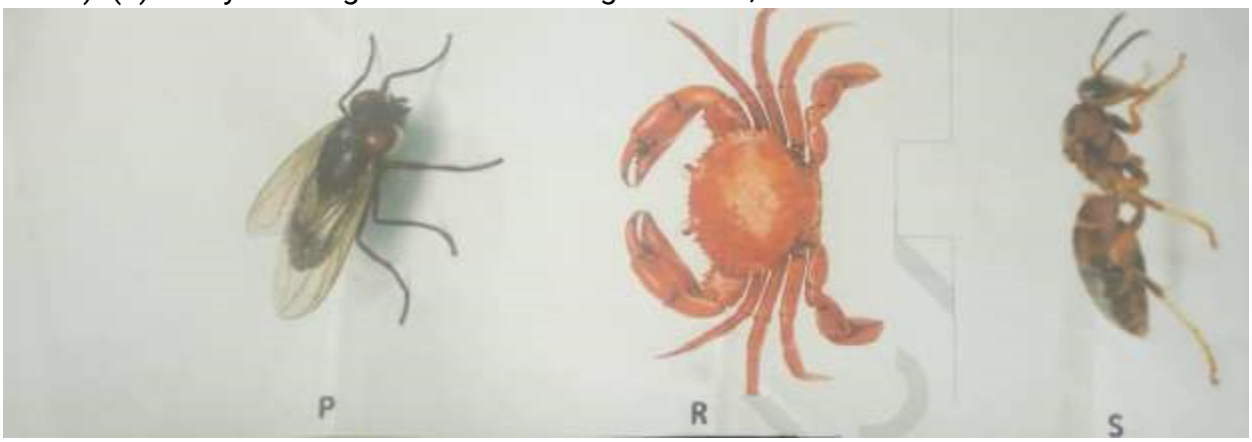
KCSE PREDICTION 2 2019 PAPER 1

1. (a) Name two branches of Biology that an oncologist needs to study in detail. (2 marks)
(b) Form one students going for an excursion on the sea shore are required to collect specimen for learning biology. Name one apparatus and a specimen it can be used to collect. (1 mark)
2. (a) Distinguish between codominance and incomplete dominance. (1 mark)
(b) State one major difference between the mitotic telophase of animal cells and that of plant cells. 1mk
3. (a) Briefly explain the biological significance of pruning in tea plants and other plants used in making live
fences (3 marks)
(b) State any two roles of the cork cells formed during secondary thickening in the dicotyledonous plants
(2 marks)
4. Below is a graphical representation of the concentration of hormones involved in the menstrual cycle against time. Study it and answer the questions that follow



(a) Name hormone K. (1 mark)
(b) Did pregnancy occur based on the cycle above? Explain your answer. (2 marks)
(c) Name the organ that secretes hormone T (1 mark)
(d) Identify the process that occurs during the time labeled L (1 mark) 5. Small birds like the European robin puff up (swell up) their feathers during winter Explain the significance of this behavioral response. (3 marks)

6. (a) An organism has a pair of short antennae and two body parts, head and trunk. State any two other characteristics that the organism is likely to have. (2 marks) (b) Study the diagrams below of organisms P, R and S.

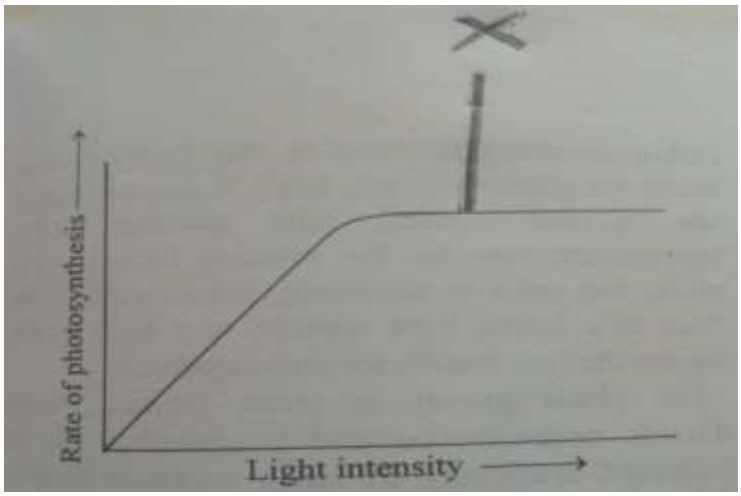


Construct a dichotomous key that would be used to identify them. (2 marks)

7. State one function of each of the following tissues. (2 marks) Skeletal muscles

Sclerenchyma tissue

8. (a) What is cell specialization? (1 mark)
(b) State two adaptations of a neuron to its function. (2 marks)
9. During a microscopy class a student was unable to see the field of view. State two possible adjustments she needed to make to ensure that the field of view becomes visible (2 marks)
10. Animals have complex excretory organs as compared to the plants. Explain. (2 marks)
11. Study the graph below and answer the questions that follow



(a) Why does the rate of photosynthesis become constant at the point labeled X? (2 marks)
(b) State two other factors that affect the rate of photosynthesis (2 marks)

12. (a) What is osmotic potential? (1 mark)
(b) Change in soil pH can affect the rate of which plants absorb mineral salts. Explain. (3 marks)

13. (a) A pyramid of biomass shows reducing energy at each successive trophic level. Give a reason for this observation. (1 mark)
(b) Control of mosquitoes by spraying oil onto stagnant water is effective. Explain why this method is however disadvantageous. (2 marks)

14. (a) What is the role of temperature in a terrestrial ecosystem? (2 marks)
(b) State two limitations of using the capture recapture method to establish population density. (2 marks)

15. Name the apparatus used to measure the following abiotic factors. (2 marks)
Penetration of light in water Light intensity

16. (a) Name a blood vessel that has capillaries on both ends. (1 mark)
(b) Briefly explain how bee stings can cause death. (3 marks)

17. A lion is an exclusive carnivore. State 2 dental adaptations it has to its mode of feeding. (2 marks)

18. During a class experiment green grams' plants were germinated in two trays containing soil. Tray A contained soil that had been mixed with nitrogenous fertilizer while in tray B the fertilizer had not been added. One week after germination the seedlings were uprooted, their roots washed and their root nodules counted. (a) What was the aim of the above experiment? (1 mark)
(b) Account for the observation made when the root nodules of the two sets of plants were counted.(2

19. Briefly explain how budding occurs in yeast. (3 marks)

20. (a) Distinguish between apocarpous and syncarpous flowers. (1 mark)
(b) Complete the table below (2 marks)

Fruit	Type of fruit	Agent of dispersal
Black jack		
Coconut		

21. Moulting is shedding of the exoskeleton of arthropods such as houseflies to allow for growth. (a)

Name the hormone that leads to the formation of the larval cuticle. (1 mark)

(b) Sketch the life cycle of the housefly. (2 marks)

22. (a) State an example of structures in animals whose development demonstrates adaptive radiation. (1

(b) Treatment of malaria is still a challenge in the world despite the invention of many antimalarial drugs.

Explain. (3 marks)

23. Name two parts in the kidney nephron where re-absorption of water takes place. (2 marks)

24. (a) Name the product of glycolysis. (1 mark)

(b) What is the role of the cristae in a mitochondrion? (1 mark)

(c) Which is the most common substrate of respiration in human beings? Give a reason for your answer.

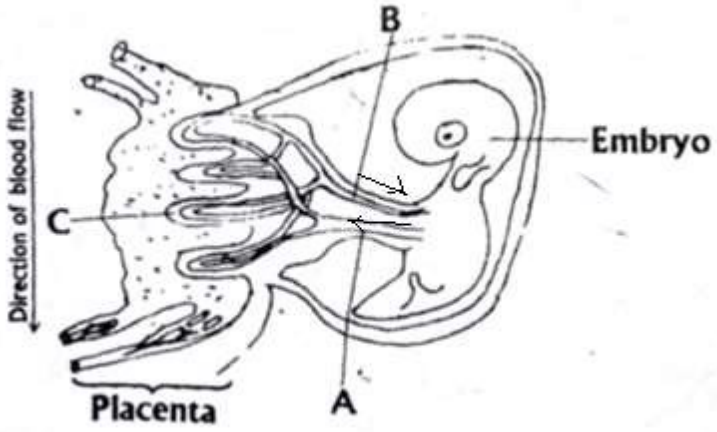
25. In the study of distribution of organisms over the world members of the 'cat family' are found in different continents. leopards and cheetahs inhabit Africa, jaguars and panthers North America while tigers are found in Asia. Explain the biological phenomenon that could have led to this distribution. (3 marks)

26. Name one disorder in humans caused by chromosomal non- disjunction. (1 mark)

PAPER 2

1.A specimen of Drosophila has red eye and when crossed with a purple mutant all the F1 had red eyes.The offspring's were mated among themselves and the following proportions of flies were produced; 201 gad red eyes and 67 had purple eyes.Using R to represent the dominant gene and r to represents the recessive gene,answer the following questions.

a) By the help of diagrams shows how the ratio of 201:67 was arrived at ,in the F2generation.
b) Draw diagrams to show the genetic details of a cross between the heterozygous red eyed and a purple eyed individual form F2. (3mks)



2.The diagram below shows the relationship between blood supplies of the embryo, placenta and the uterus. Use it to answer the question that follow.

a) Name the part labeled A and C. (2mks)

b) State any two functions of placenta in mammals. (2mks)

c) .(i)What kind of flow does maternal and foetal capillaries exhibit at the placenta. (1mk)

(ii)Why is this kind of flow(c) (i) have an advantage. (1mk)

d) If the maternal and foetal blood circulatory system were to be directly connected at the placenta suggest what may happen. (1mk)

e) In lactating mammals if the pituitarygland isremoved, explain what happens. (1mk)

3.A student was given four test tubes A, B, C and D, each containing a different mixture among the following:

i) Starch +amylase + maltase+water ii) Starch +Pepsin +Water iii) Starch +Glucose +Water

iv) Cellulose +amylase+trypsin+Water

She placed the test tubes in an incubator at 30^0C until all possible reactions had taken place.She then took samples from each test tube and tested them separately for starch,reducing sugar and protein.The results obtained are given in the following table.

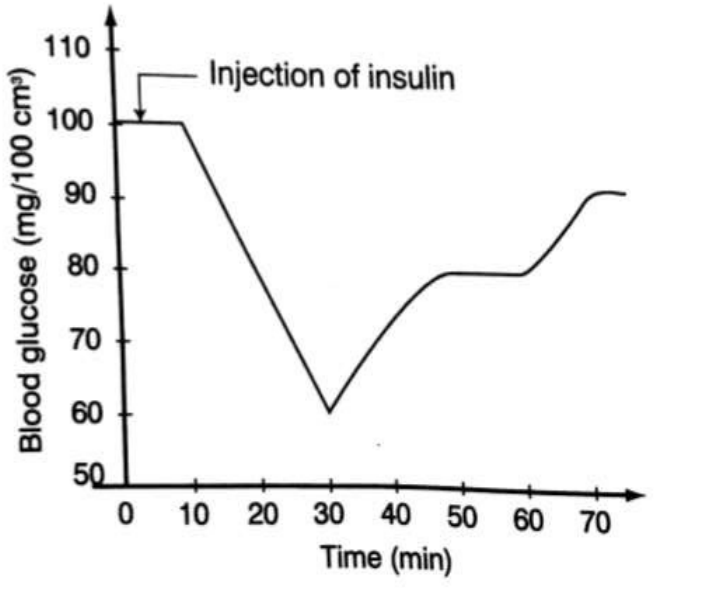
Tube	Starch	Reducing	Protein
A	Present	Present	Absent
B	Absent	Absent	Present
C	Present	Absent	Present
D	Absent	Present	Present

a) Name a reagent used to test for reducing sugar and state the appearance of a positive result.(2mks)

b) Identify the contents of each of the test tube A,B,C and D according to the results obtained.(4mks)

c) State the role of enzyme in respiration. (2mks)

4. The graph below shows the effect of injecting one unit of insulin into aperson .The concentration of glucose in the blood is measured at regular intervals



a) Why is insulin injected into blood stream directly instead of being taken orally. (2mks)

b) Explain the fall in blood glucose level. (2mks)

c) Name the mechanism that led to the increase in blood glucose level when it had been falling. (1mk)

d) Name the hormone responsible for the conversion of glycogen to glucose. (1mk)

e) State the effects of each of the following in human beings.

i)Too much glucose in the blood. (1mk) ii) Very little glucose in the blood. (1mk)

5. The diagram below shows a stem of a passion fruit twining around a post.

a)What is the name given to the type of growth movement shown above? (1mk)
b) What is the biological importance of this growth? (1mk)
c.i)Account for the twining growth pattern. (3mks) ii)
Name three other types of growth responses exhibited by plants. (3mks)

SECTION B(40 MARKS) Answer question 6 and either question 7 or 8

6.The formation of acid rain is a serious environmental concern.Sulphuric acid is present in acid rain and has adverse effects on both plants and animals.

a) Name two other acids (other than sulphuric acid)that can be found in acid rain. (2mks)
b) An experiment was carried out to investigate the effects of dilute sulphuric acid on the growth of plant seedlings.Batches of seedlings were grown in glass dishes on filter paper to which dilute sulphuric acid was added.The dishes were then incubated.The root and shoot lengths were measured after 65 hours.The results obtained are as shown in the table below.

Sulphuric acid Concentration (mol/dm^{-3})	Mean root Length(mm)	Mean shoot Length(mm)
0	55.5	25.2
$1x10_{-3}$	63.4	18.4
$3x10^{-3}$	6.5	9.5
$4x10^{-3}$	2.0	4.6
$6x10^{-3}$	1.8	0.8
$7x10^{-3}$	1.5	0.5
$8x10^{-3}$	1.3	0.3
$9x10^{-3}$	1.3	0.0
$10x10^{-3}$	1.0	0.0

Plot a graph of the mean root length and the mean shoot length against the sulphuric acid concentration on
the same grid. (7mks)

c) Describe the relationship between the concentration of sulphuric acid and the:
i)Growth of the shoots. (2mks)

ii)Growth of the roots. (2mks)

d) Estimate the mean root and mean shoot lengths when the concentration of sulphuric acid is $5x10^{-}$ 2mks

e)State two other effects of acid rain. (2mks)

f) State three ways of preventing acid rain. (3mks)

7.

a) Describe the following terms:
   i. Secretion
   ii. Excretion
   iii. Egestion (3 mks)

b) Explain how the mammalian kidney is adapted to its functions. (17 mks)

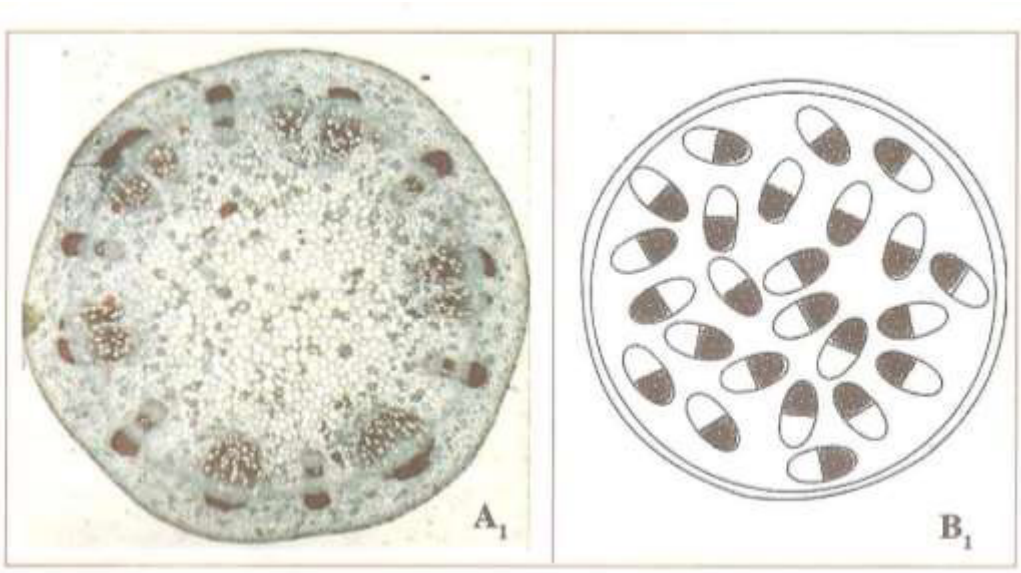
8.Explain the role of hormones in the growth and development of plants. (20mks)

PAPER 3

1. You are provided with specimen A and B
   a) Name the sub-division to which the specimen belong (1mk)
   b) Name the class to which the specimens belong (2mks)
      A……..
      B……..
   c) State three observable differences between the leaves of specimen A and B (3mks)

Leaves A	Leaves B

   d) the diagram below show the cross-sections of stems obtained from specimens A and B



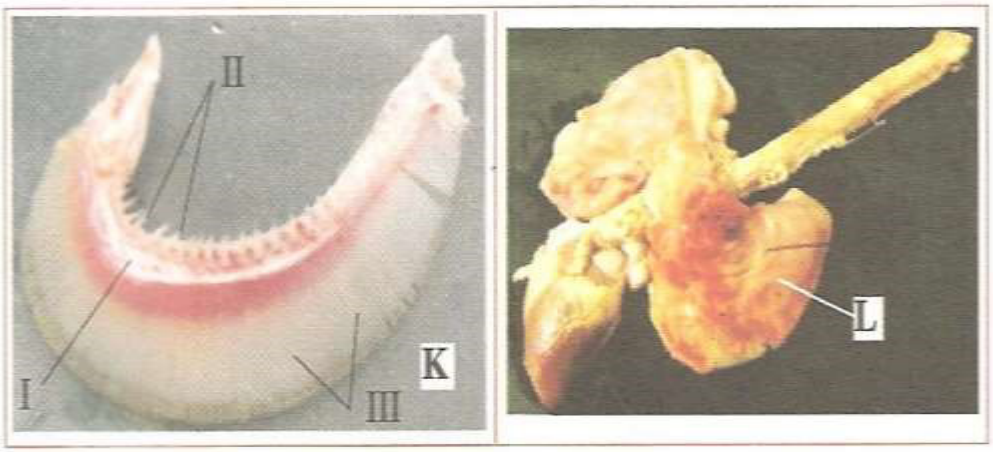
(i) Match the stem cross-sections with the specimens (2mks)

(ii) Outline three differences between the two stems (3mks)

Specimen A_1	Specimen B_1

e) Suggest the agent of pollination of the flowers of specimen A (1mk)
Give reason for your answer (1mk)

2. You are provided with photographs of specimens labeled **K (gills)** and **L (lungs)**. Examine them and answer the questions that follow.



(a) Name the class of organisms from where the specimens were obtained (2mks)

Specimen	Class
K	
L	

(b) Label all the parts of specimen K on the photograph (3mks)
I…… II……..
III……

(c) State the functions of each of the parts you have labeled in (b) above (3mks)

(d) State three ways in which the part labeled L is adapted to its functions (6mks)

(e) State the functional relationship between specimens K and L (1mk)

3. You are provided with:
   - 1ml Olive oil
   - K_1 (Concentrated sodium hydrogen carbonate solution)
   - K_2
   - Irish potato
   - Test tube
   - Iodine solution

   Label two test tubes X and Y. Into each test tube; put $2cm^3$ of water and 8 drops of Olive oil. To the test tube labeled X, add 8 drops of Liquid K_1. Shake both test tubes and allow the

contents to stand for 2 minutes

a)(i) Record your observation in: (2mks)

Test tube X

Test tube Y

(ii) Name the process that has taken place in test tube X (1mk)

(iii) Stage the significance of the process named in (a) (i) above in digestion (1mk)

(iv) Name the:

I. Digestive juice in human beings that has the same effect on oil as liquid K_1 (1mk)

II. Region of alimentary canal where the juice is secreted (1mk)

b) Label two test tubes E and F. place $2cm^3$ of liquid K_2 into each. Add a drop of iodine solution into each test tube

(i) Record your observations (1mk)

(ii) Suggest the identity of liquid K_2 (1mks)

(iii) Cut out a cube whose sides are 1cm from the irish potato provided. Crush the cube to

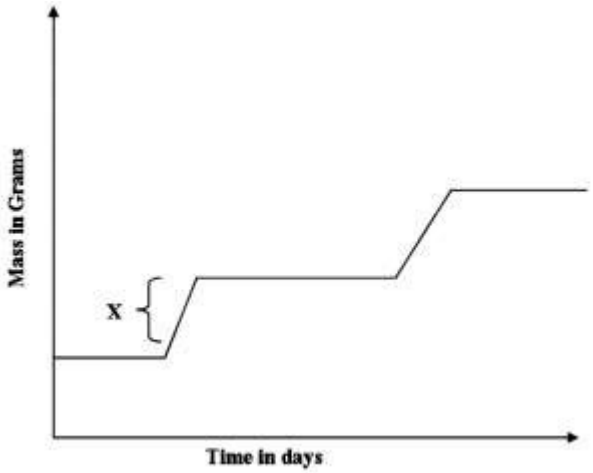
obtain a paste and place the paste in the test tube labeled E. Leave the set up for at least 30minutes

Record your observations (2mks)

Account for the results in (b) (iii) above (2mks)

KCSE PREDICTION 3 2019 PAPER 1

1. The graph below represents the growth pattern of animals in a certain phylum.



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

(b) (i) Identify the process represented by **X**. (1 mark)

(ii) Name the hormone responsible for the process in b(i) above. (1mark)

(c) State the importance of the growth of a pollen tube to a plant. (1 mark)

2. (a) What is the function of Sodium hydrogen Carbonate that is added to test solution of non-reducing sugar. (1 mark)

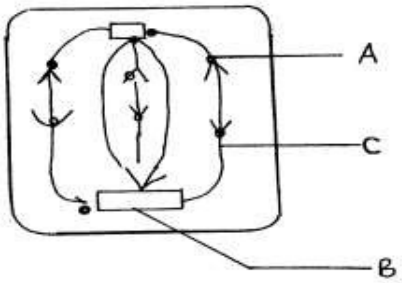
(b) The equation below represents a process X which is controlled by enzymes.

Process X …… (1 mark)

Enzyme R
$C_6H_{12}O_6 + C_6H_{12}O_6 \underset{R}{\overset{X}{\rightleftharpoons}} C_{12}H_{22}O_{11}$
Glucose + Fructose Sucrose (1 mark)

3. The diagram shows an epidermal cell in mitotic cell division.

(i) Name the process **X** and enzyme **R**



(a) Name the stage of mitosis it represents …… (1 mark)

(b) Name the structures

A …… (1 mark)

C…… (1 mark)

4. What is the effect of gibberellins on the shoots of plants? (4 marks)

5. (a) Give **two** forms in which carbon (IV) oxide is transported in human blood. (2 marks) (b) Name the enzyme that enhances the loading and off – loading of carbon (IV) oxide in the human blood. (1 mark)

6. (a) What is the importance of the counter current flow in the exchange of gases in a fish? (2 marks)

(b) State **two** ways in which the tracheoles of an insect are adapted to their functions. (2 marks)

7. The equation below represents a reaction that occurs during respiration in a cell.

K + Phosphate ⟶ Adnenosine triphosphate

(a) Identify the compound K. (1 mark)

(b) State **two** differences between **K** and **ATP.** (2 marks)

(c) Name the organelle responsible for the production of energy in a cell muscle. (1 mark)

8. Explain how crops grown along roads can be a source of lead poisoning to human beings. (2 marks)

9. Explain why plants growing in low altitude areas grow faster than those in high altitudes. (3 marks)

10. List down **four** phenotypic characteristics that have been selected for the production of strains suitable for modern agricultural purposes. (4 marks)

11. Name the type of eye defects that can be corrected by;

(i) Use of bifocal lens (1 mark)

(ii) Use of artificial lens (1 mark)

(iii) Use of concave lens (1 mark)

12. (a) The length from the tail tip to the anus of a certain tilapia fish is 10 cm. The length from the tail tip to the mouth is 35cm. Calculate the tail power of the fish. (Show all your working).

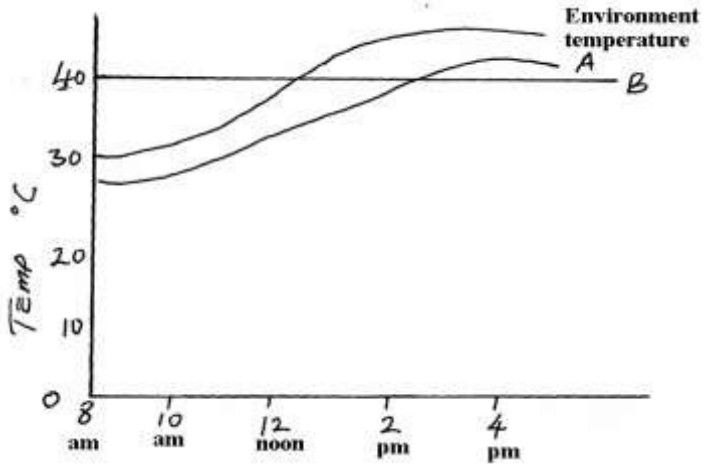
(2 marks)

(b) What is the significance of high tail power in fish? (1 mark)

13. List down **three** differences between the endocrine system and nervous system. (3 marks)

14. Distinguish between the struggle for existence and survival for the fittest as used in the theory of natural selection. (2 marks)

15. The body temperatures of two animals A and B varied as below with environmental Temperature



(a) Which of the animals is;

(i) Endothermic ……. (1 mark)

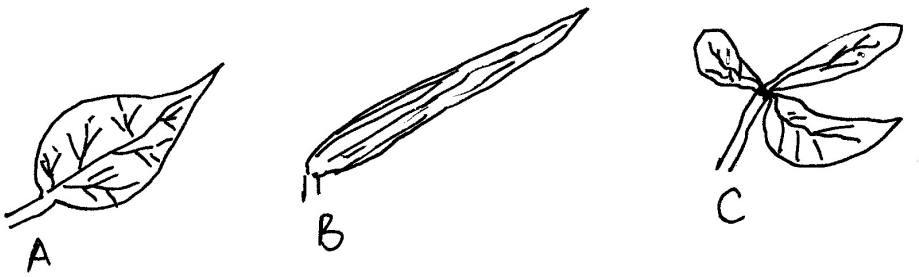
(ii) Ectothermic …… (1 mark)

(b) With a reason, state which of the animals is likely to be widely distributed. (2 marks)

16. State **three** roles of oestrogen during the menstrual cycle (3 marks)

17. State **three** characteristics of cells at the zone of cell division in an apical meristem. (3 marks)

18. Below are diagrams of three leaves A, B and C. Construct a two step dichotomous key which can be used to identify each of them. (4 marks)



19. (a) Name **two** mutagenic agents. (2 marks)

b) Identify the type of gene mutations represented by the following pairs of words.

i) Shirt instead of skirt …… (1 mark) ii) Hopping instead of shopping …… (1 mark)

20. Liver damage leads to impaired digestion of fats. Explain this statement. (2 marks)

21. Explain why several lateral buds sprout when a terminal bud in a young tree is removed. (3 marks)

22. (a) State **two** structural adaptations that make xylem vessels suitable for transport of water and mineral salts. (2 marks)

(b) List any **three** adaptations of the root hair cells to their functions (3 marks)

23. (a) Define the following terms:- (2 marks)

(i) Species

(ii) Binomial nomenclature

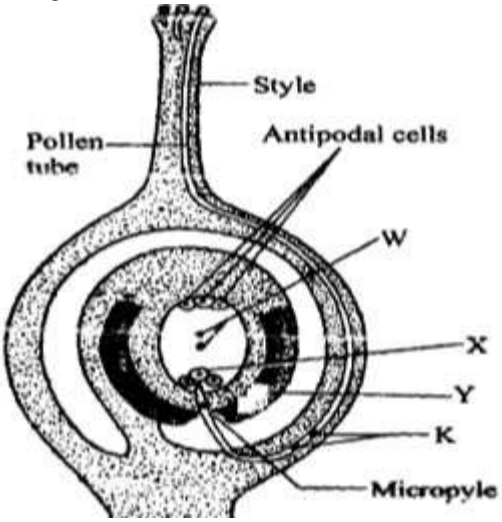
24. What is the significance of active transport in the human body? (3 marks)

25. Explain how the biceps and triceps muscles bring about the movement at the hinge joint of the elbow in man. (2 marks)

PAPER 2

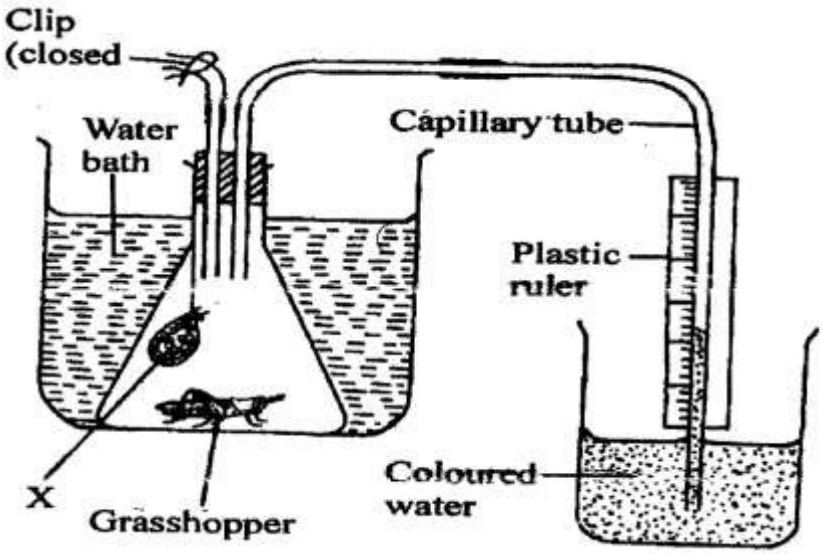
SECTION A (40 MARKS)
Answer all questions in this section.

1. The diagram below shows a cross section through the female part of a flower.



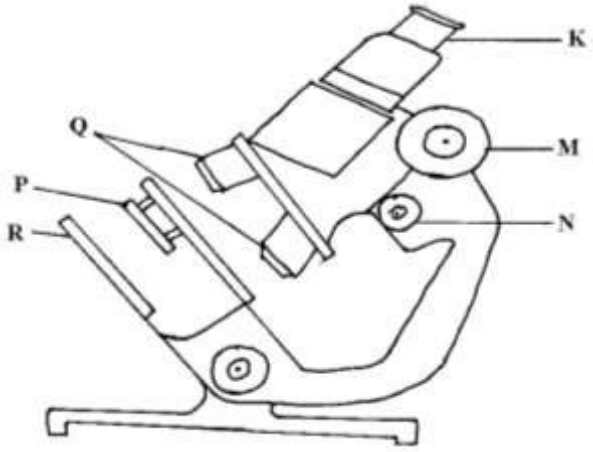
a) Name the structures labeled **W**, **X** and **Y**. (3 marks)
b) State **two** functions of the pollen tube. (2 marks)
c) What happens to antipodal cells after fertilization? (1 mark)
d) Name the structure labeled **K** and state their role. (2 marks)

2. The diagram below illustrates and experiment to determine the rate of respiration in a small insect.



a) Name the chemical compound labeled **X** and state its function. (2 marks)
b) Why is it necessary to place the flask in a water bath? (3 marks)
c) What changes would you expect to observe in the level of coloured water in the capillary tube after the experiment has run for five minutes? (1 mark)
d) Explain the changes you have started in (c) above. (3 marks)

e) State how you can set up a control experiment. (1 mark) 3. The diagram below shows some components of a light microscope.



a) Name the parts labeled (2 marks)
K ……
M ……

b) State the functions of (2 marks)
P ……
Q ……

c) A student was viewing a prepared slide of a plant cell under high power microscope. The features of the cell were blurred. Which one of the labeled parts of the microscope would the student use to obtain:-

(i) a sharper outline of the features. (1mark)

(ii) Give the formula used to calculate magnification in a light microscope. (1mark)

d) A student was preparing a section of a plant cell to be viewed on a light microscope. Give a reason for each of the following steps:-

(i) Cutting a very thin section. (1mark)

(ii) Staining the section. (1mark)

(iii) Putting the section in water. (1mark)

4. In an experiment, a black mouse was mated with a brown mouse; all the off-springs were black. The off-springs grew and were allowed to mate with one another. The total number of (F2) generation off-springs was 96.

a) Using the letter symbols capital letter **B** for the gene of black colour and small **b** for brown colour, Work out the genotype of the F1 generation. (3 marks)

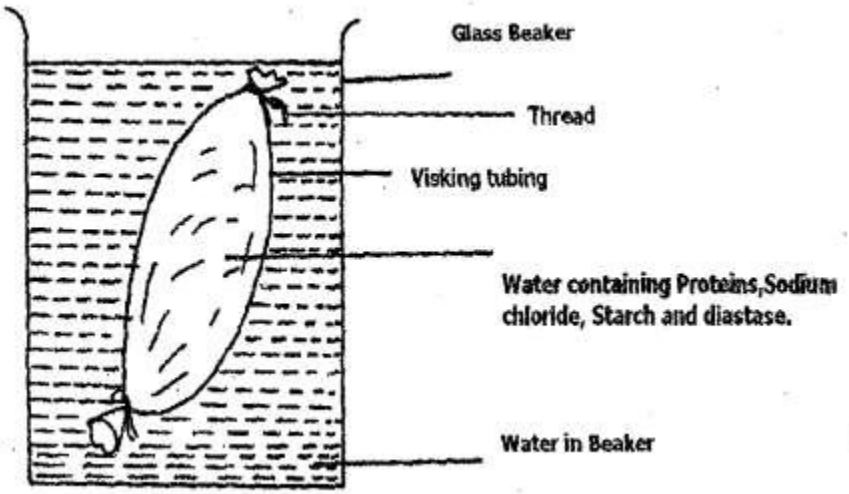
(b) From the information above, work out the following for the F2 generation.

(i) Genotypic ratio. (2 marks)

(ii) Phenotypic ratio. (1 mark)

(iii) The total number of brown mice (2 marks)

5. In a physiological experiment, starch, protein, diastase and sodium chloride were added to water and put inside a visking tubing. The visking tubing was then placed in a water bath maintained at a temperature between *35* --- 40°C. The set up was as shown in the diagram below.



The following observations were made after the procedures indicated.

Contents in	At the start of experiment	After 1 hour
Visking tubing	(i) Solution tastes salty	Solution tastes salty
	(ii) Visking tubing is not firm	Visking tubing is firm
	(iii) After boiling with Benedicts solution, solution remains blue	After boiling with Benedicts solution the solution turns brown
	(iv) On addition of solution hydroxide followed by copper sulphate solution to the solution, the colour changes to purple	On addition of sodium hydroxide followed by coppers sulphate to the solution, the colour changes to purple
Beaker	(i) Water is tasteless	Solution tastes sweet/salty
	(ii) After boiling solution with Benedicts solution, Blue colour remains	After boiling solution with Benedict's solution, colour turns to brown.
	(iii) On addition to sodium hydroxide followed by copper sulphate solution, colour remains blue	On addition of sodium hydroxide followed by copper sulphate solution, colour remains blue

a) Name the process by which salt moved into the water in the beaker from the visking tubing.(1mark) (b) (i) Name the food substance responsible for the brown colour observed after 1 hour both in the beaker and visking tubing when solutions are boiled with benedicts solution. (l mark)

(ii) Account for the observation in (b i) above. (3 marks)

(c) (i) Name the food substance tested with sodium hydroxide followed by copper sulphate solution(s) (1 mark)

(ii) Account for the absence of the food substance named in (c i) above in the beaker after 1 hour. (l mark)

(d) After one hour the visking tubing was firm. State the term used to describe this state. (1 mark)

SECTION B (40 MARKS)

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

6. An experiment was carried out whereby three healthy rats were fed on equal amounts of glucose. After half an hour, the glucose concentration per ml. of blood was measured at 15 minutes intervals for three hours. The following results were obtained.

Glucose conc. / Ratsmg/ml	0 min	15 min	30 min	45 min	60 min	75 min	90 min
A	0.800	0.774 0.715	0.680	0.650 0.595	0.555		
B	0.745	0.695 0.695	0.660	0.635 0.600	0.545		
C	0.795	0.695 0.665	0.635	0.590 0.550	0.495		
Mean	0.780	0.720	0.691	-	0.625	-	0.532

(a)

i. Calculate the mean concentration of glucose in mg per ml of blood at 45 and 75 minutes. Record your answer on the table. (2 marks) ii. On the graph paper provided, plot a graph of the mean glucose concentration against time. (6 marks)

iii. What was the mean glucose concentration in the blood after 37.5 minutes? (1 mark)

iv. Give a reason why it was necessary to use three rats in the experiment instead of one. (1 mark

v. Why was the initial concentration of glucose in the rats not the same? (2 marks)

vi. Account for the difference in mean glucose concentration during the period. (3 marks)

(b) Give **two** reasons why glucose is the main respiratory substrate. (2 marks)

(c) Give three ways in which glucose is assimilated in the body. (3 marks) 7.

(a) What assumption are made when using the captured recapture method in estimating population of animals. (5 marks)

(b) Describe how you would use the capture – recapture method to estimate the population of fish in the school pond. (15 marks)

8. (a) Define natural selection. (2 marks)

(b) Natural selection brings about adaptation of a species to the environment. Discuss.(18 marks

PAPER 3

1. The diagram below shows bones obtained from the same mammal.

(b) Draw a diagram of the bones, arranged as they appear in the mammal from which they were

obtained
from. (3 marks)

(c) On your diagram indicate by naming the types of joints between the bones. (2 marks)

(d) (i) Give **three** adaptations of bone labeled 3 to its functions. (3 marks)

(ii) Give **three** adaptations of bone labeled 4 to its functions (4 marks)

2. You are provided with solution labeled **J**, use the reagents provided to test for the food substances.

(a) Use the iodine solution to test for the food substance in solution **J**.

Food substance (1 mark)

Procedure (1 mark)

Observation (1 mark) Conclusion (1 mark)

(b) Use Benedict's solution to test for the presence of the food substance in solution **J**.

Food substance (1 mark)

Procedure (1 mark)

Observation (1 mark)

Conclusion (1 mark)

(c) Use DCPIP solution provided to test for the presence of the food substance in solution **J**

Food substance (1 mark)

Procedure (1 mark)

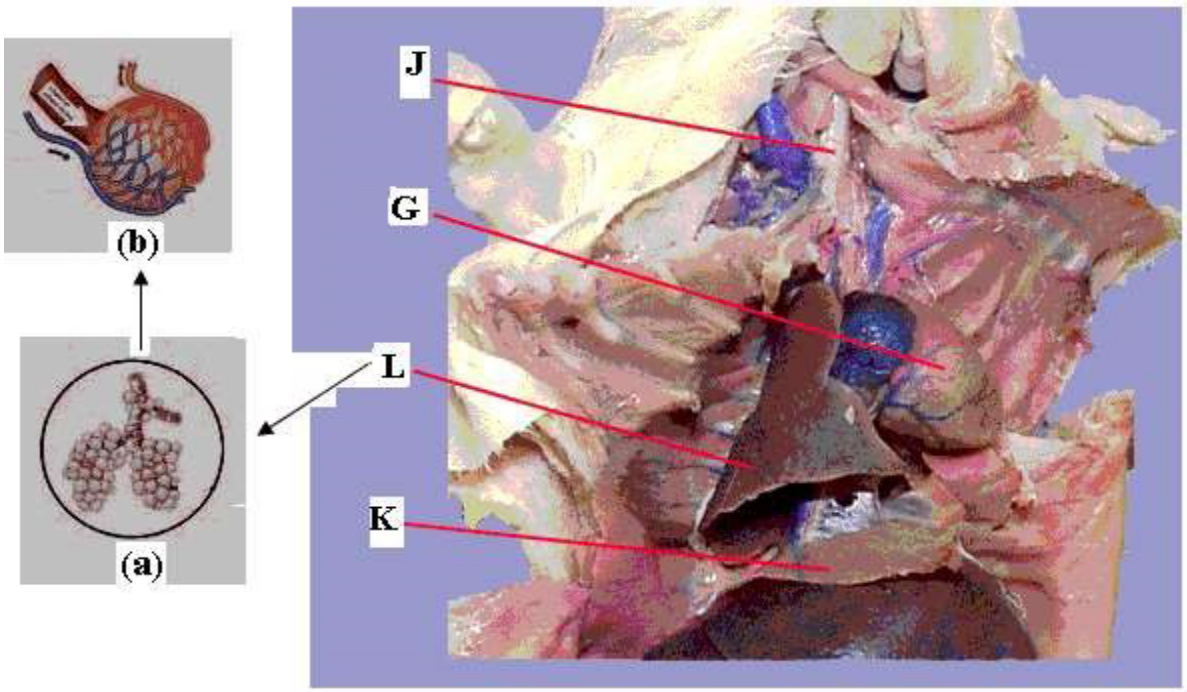
Observation (1 mark) Conclusion (1 mark)

(d) When testing for non-reducing sugars explain the role of the following substances.

(i) Dilute hydrochloric acid. (1 mark)

(ii) Sodium hydrogen carbonate (1 mark)

3. Study photograph labeled **V** which is a display of internal organs of a small mammal. Photograph **F** is an inset of internal structure of part labeled **L**. Study them carefully.



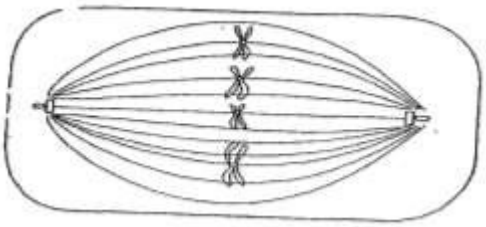
Photograph F **Photograph V**

(a) Name the part of the mammalian body where the organs shown in the photograph are found. (1 mark)
(b) Identify the organ system that consists of parts **J** and **L** in the photographs. (1 mark)
(c) (i) Name the parts labelled **J** and **K**. (2 marks)
(ii) Give the function of the part labelled **G**. (1 mark)
(d) State **two** adaptations of organ in **L** to its functions (2 marks)

(e) **F (a)** is an inset of the internal structure of part **L** showing the position of the functional units of **L**. One of these functional units is shown in the inset **F (b)**.
(i) Identify the functional unit shown in inset **F(b)** and give its function. (2 marks)
Identity:
Function:
(ii) Give **one** observable feature in the structure you have named in (e)(i) above that adapt it to its function. (1 mark)

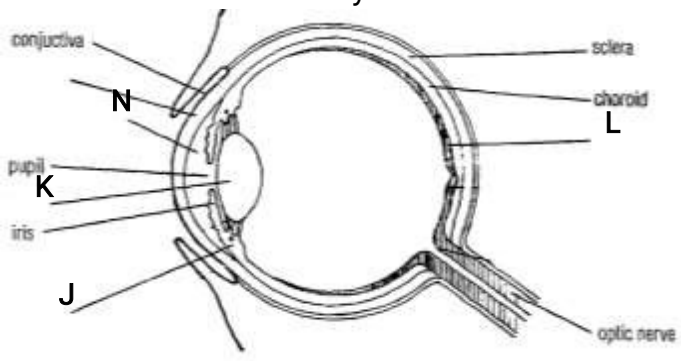
KCSE PREDICTION 4 2019 PAPER 1

1. The diagram below represents a stage in cell division.\



(a) Identify the stage of cell division (1mk)
Give a reason for your answer (1mk)

2. The diagram below shows a mammalian eye.



(a) Name the parts labeled J, K, and L (3mks)
(b) Explain how the following parts are adapted to their function.
(i) K ……(1mk)
(ii) P……(1mk)
(c) Name the eye defect caused by short eyeball and less refractive lens. (1mk)

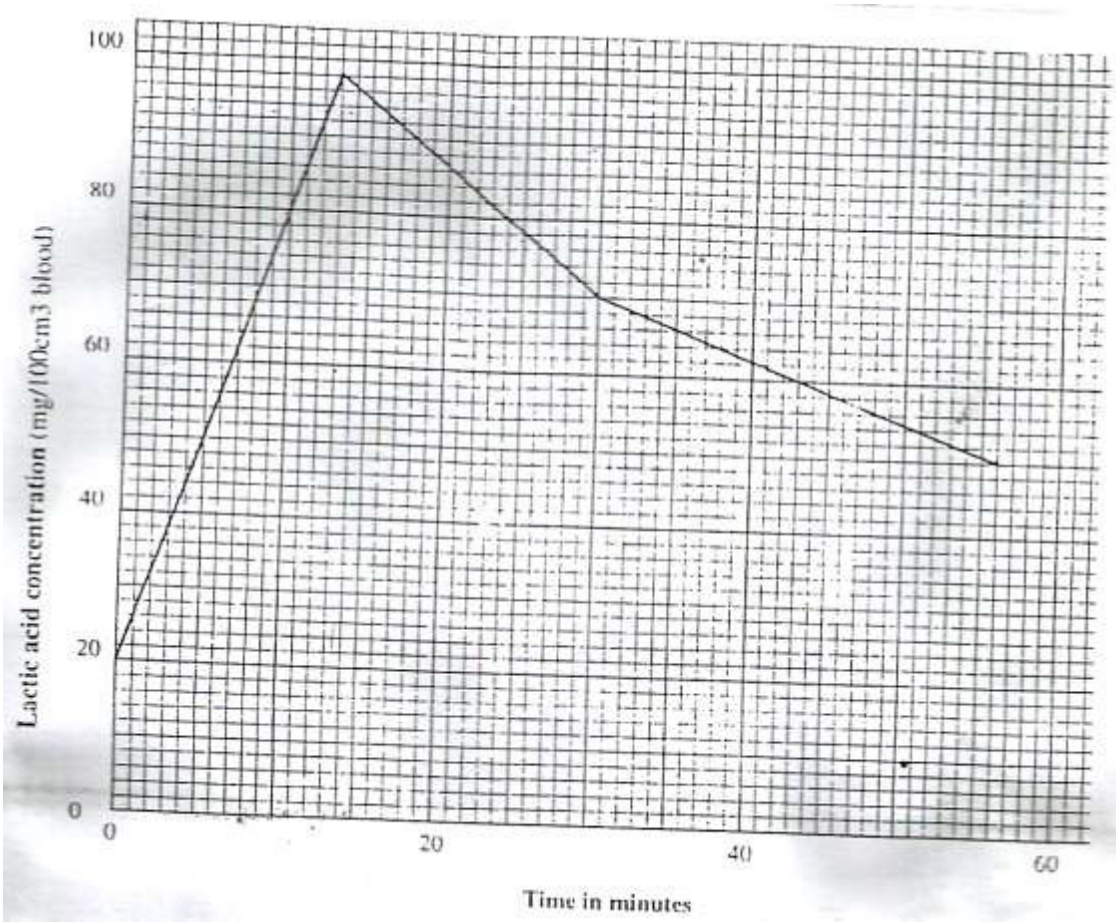
3. Outline **two** differences between plant divisions bryophyte and Pteridophyta (2mks)
4. A certain animal had one cell from its alimentary canal observed under light microscope. A total of 40 chromosomes were seen.
(a) State the number of chromosomes in
(i) The spermatozoon of this animal (1 mk)

(ii) One of cells in the tongue. (1mk)

(b) Name a structure in mature plant where meosis takes place. (1mk)

5. State **one** functions of golgi apparatus (mk)

6. The concentration of lactic acid in blood during and after an exercise was determined. The results are shown in the graph below.



(a) (i) By how much did the lactin acid increase at the end of 10 minutes? (1mk

(ii) After how many minutes was the lactin acid concentration 78mg/100cm^3 (2mks)

(iii) What would be the concentration of lactin acid at the 60th minutes. (1mk)

(b) Give a reason for the high rate of production of lactic acid during the exercise. (1mk)

7 a) What is meant by the term sex linkage. (1mk)

b) Part of one strand of DNA molecule was found to have the following sequence

G-C-C- G – A – T- T – T – A – C – G – G

What is the sequence:

(i) of the complimentary DNA strand? (1mk)

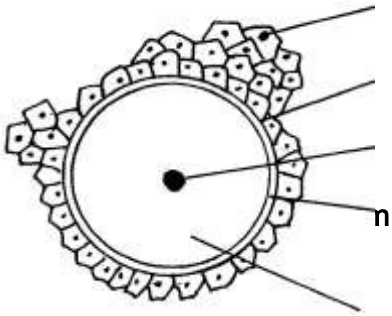
(ii) On a m-RNA strand copied from this DNA portion? (1mk)

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

X

Y

Nucleus



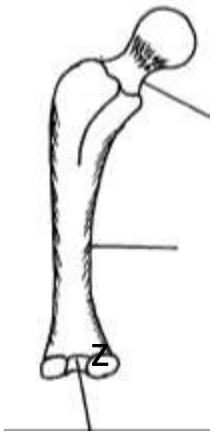
(a) Identify the cell (1mk)

(b) Label the parts **X,Y** and **W** (3mks)

9. The diagram below shows a bone of the hind limb. Study it and answer the questions that follow.

Q

R



(a) Name the bone (1mk)

(b) Name the parts labelled **Q** and R (2mks)

(c) Name the structure that articulates with the part labeled **Z** and the joint formed? (2mks)

Structure ……

Joint ……

10.State **Two** ways by which the ileum is adapted fro absorption of food materials? (2 mks) 11.

a) What is a teat pipette used for in Biology Laboratory Lesson? (1 mark)

b) Give the name of a reagent that is used to test substances and at the same time used as a stain in the laboratory. (1mark)

12. A form one student observing Onion epidermal cells under the low power objective counted 5 cells on a field of view measuring 5mm

(a) Estimate the size of one cell. (1 mark)

(b) If the eye piece magnification used was × 10 and that of the objective lens was × 10. What was the magnification of the microscope? Show your working. (2 marks)

( ) Estimate by approximation the Number of cells that would be observed if the objective lens

magnification was changed to x 40 (1mark)

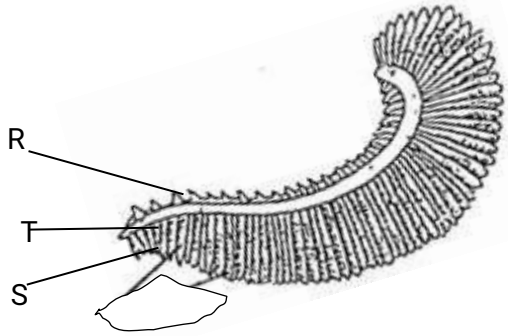
13. Name one cofactor and one co-enzyme required for a blood clotting process to be normal.

a) Co-factor - ……(1mark)

b) co-enzyme - ……(1mark)

14. (a) What is counter current Mechanism in a Tilapia fish? (2marks) (b) The diagram below represents an organ from a finned bony fish. Study it and answer the

questions that follow



S

i. Identify the organ. (1mark)

ii. State **two** adaptations of the part labeled **S** to its functions. (2 marks) 15. The equation below represents a process that takes place in plants and animals

$$C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O$$

(a) Name the process. (1 mark)

(b) State two requirements necessary for the process (a) above to process at maximum rate.

(2 marks)

(c) What is the role of Cristae in the process above? (1 mark)

(d) In which part of the cell does glycolysis and Krebs cycle occur? (2 marks)

Glycolysis - .....

Krebs cycle -.....

16. State **two** applications of Genetic in our day to day life. (2 marks)

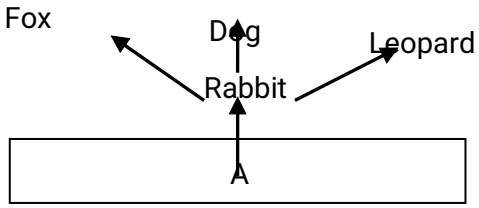
17. State two functions of the cell sap. (2 marks)

18. a) State two methods by which fossils were formed. (2 marks)

(b) What do similarity of wings of bats and those of insects illustrate? (1 mark)

19. Give two reasons why *Carolus Linneaus* preferred the use of latin language in the scientific naming of living organisms. (2 mks)

20 a) The diagram below shows part of a food relationship in an ecosystem



(i) Name the food relationship shown in the diagram (1mk)

(ii) Name the trophic level occupied by organism **A** 1mk)

(iii) What is the main source of energy in the ecosystem shown in the diagram above? (1mk)

(b) The table below shows the percentage composition of blood plasma and urine for four substances

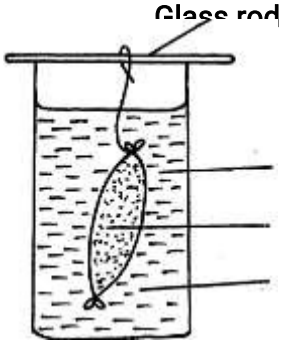
Component substance	Blood plasma %	Urine %

Urea	0.03	2.0
Water	90	90
Plasma proteins	8.0	0
Glucose	0.1	0

(i) Account for the absence of plasma proteins in urine (1mk

(ii) Urea concentration being greater in the urine than in the blood plasma (1mk)

21. An investigation was set up as shown in the diagram below.

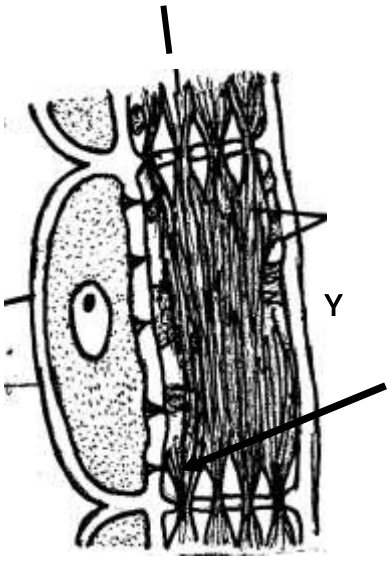


After 30 minutes, starch suspension had turned blue-black while iodine solution retained its colour.

(a) Name the physiological process that was being investigated in the experiment. (1mk)

(b) Account for the results observed after 30 minutes. (2mks)

22.The diagram below illustrate part of phloem tissue.



(a) Name the parts labeled. (2mks)

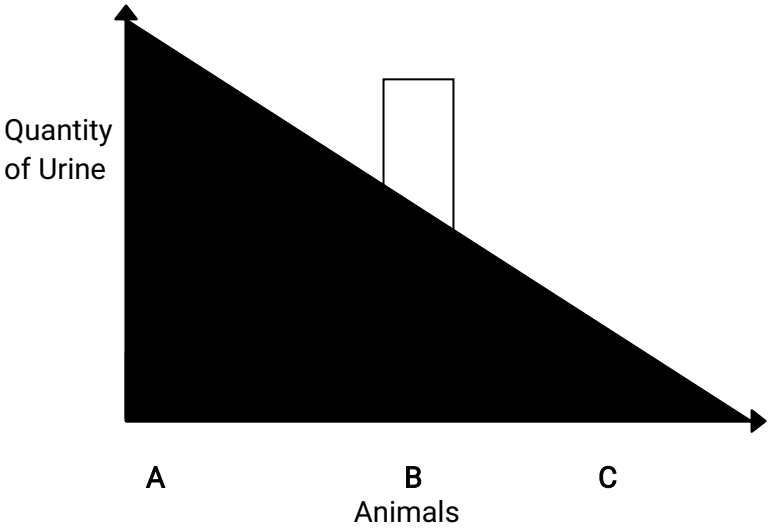
X……

Y……

(b)State the function of the part labeled Z (1mk)

23. The following charts illustrate the quantity of urine passed out by four mammals of different

species in different habitats.



a) Name the forms in which the following organisms are likely to excrete their nitrogenous wastes.

(2mks)

a. Animal **B**
b. Animal **C**

b) Give **two** structural modification of the nephron of animal B that enables it to survive in its habita

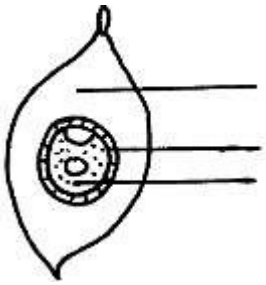
(2mks)

24. The diagram below represents the vertical section of a fruit.

Fibrous Mesocarp

Hard waterproof endocarp

Endosperm



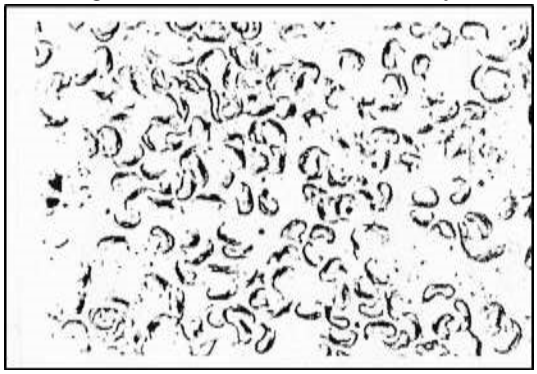
(a) Suggest the possible agent of dispersal of this fruit. (1mk)

(b) Explain **two** observable features that adapt the fruit to its mode of dispersal.

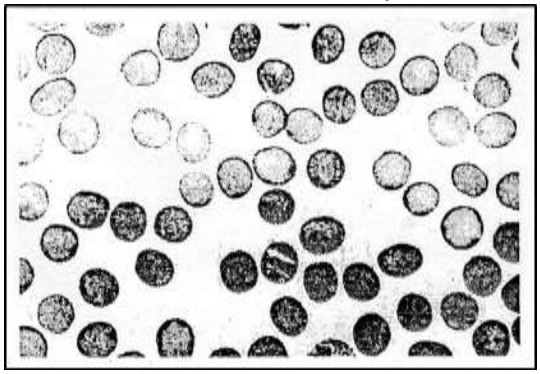
(1 mk)

PAPER 2

1. The diagrams below shows samples of blood obtained from two different persons **A** and **B.**



Blood sample from person **A**



Blood sample from person **B**

a) What genetic disorder is person **A** suffering from? (1 mark)
b) State one advantage and one disadvantage of the disorder in (a) above (2 marks)
c) Work out the genotypes and phenotypes of the resulting offsprings of marriage between person **A** and person **B** (5 marks)

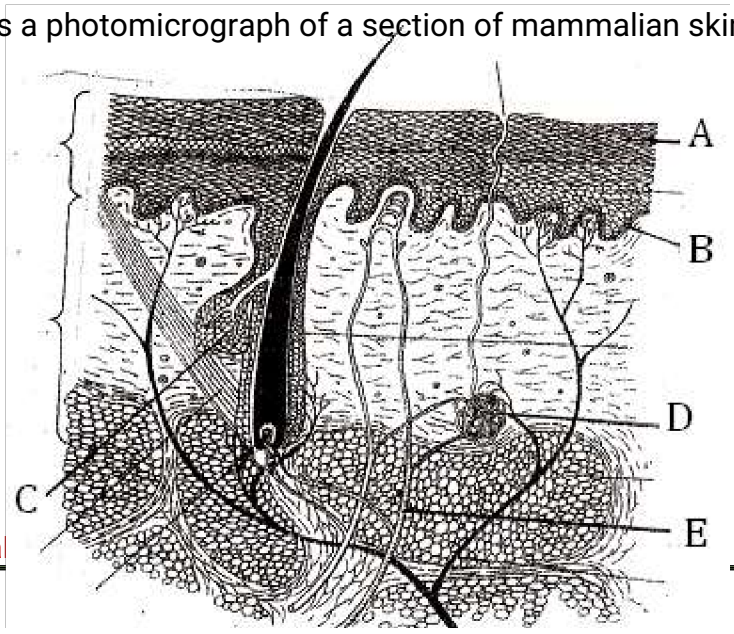
2. The results in the table below show the effects of some conditions for seed germination. In each experiment, all other environmental conditions were kept constant, except for the one being investigated.

Experiment	Treatment	% germination
P	- Seeds placed in tightly closed container with pyrogallic acid.	0
L	i) Seeds kept in source of light. ii) Seeds kept in dark cupboard	96 97
M	i) Seeds kept in a refrigerator at 4^0C ii) Seeds kept in an oven at 60^0C iii) Seeds kept at 35^0C	0.5 0 92
V	i) Dry seeds in closed containers ii) Moist seeds in closed container	0 87

a) i) What was the purpose of pyrogallic acid in experiment (P) (1mark)
ii) State the aim of the experiment (L) (1 mark)
b) i) Account for the results obtained in experiment set-up (M). (3marks) ii) State why 100% germination was not achieved in experiment (V) (L) (1mark)
c) Of what biological significance is the condition necessary for germination being investigated by experiment (V). (2marks)

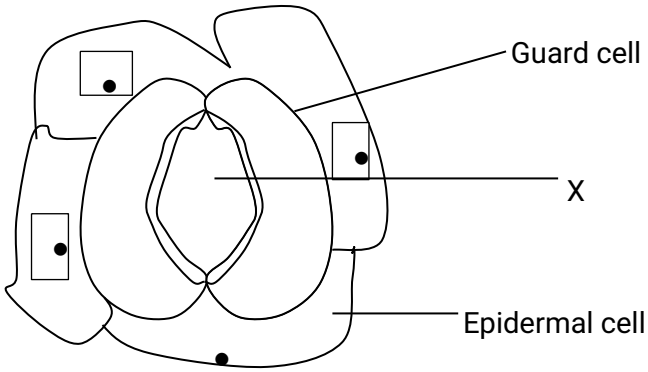
questions that follow.

3. The figure below is a photomicrograph of a section of mammalian skin. Study it and answer the



a) Suggest why only one complete hair follicle is visible in the figure. (1mark)
b) State **two** functions of the secretion from the gland labeled C (2marks)
c) Indicate on the photograph by means of line labeled 'K' a muscle that contract to make hair become erect. (1mark)
d) Name the parts labeled ABCD (3marks)
e) Explain the behaviour of structure E when environmental temperature falls to 10^0C. (2marks)

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



a) i)Name the structure labelled **X** on the diagram. (1 mark)
ii) State **three** adaptations of the guard cell to its function of opening and closing of stomata in plants. (3 marks)

b) The mammalian lung is known to have adapted the mammal to terrestrial habitat by having a pleural membrane.
i) State **two** functions of a pleural membrane that gives the mammal advantage over other organisms.
ii) Name **two** diseases of the respiratory system. (2 marks)

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

Carbon (IV) Oxide + water ⟶ Glucose + X

a) Name substance X (1mark)

b) Other than the conditions stated in the equation, state **two** other conditions necessary for the reaction (2mks)

c) Name **two** types of cells in which this process occurs (2mks)
d) Name the process represented by the equation given above (1mk)
e) State the importance of the process named in (e) above (2mks)

SECTION B (40 MARKS)

Answer question 6 (compulsory) and either7 or 8 in spaces provided after questions 8.

6. In an experiment to determine the effect of ringing on the concentration of sugar in phloem, a ring of bark from stem of a tree was cut and removed. The amount of sugar in grammes per $16cm^3$ piece of bark above the ring was measured over 24hour period. Sugar was also measured in the bark of a similar stem of a tree which was not ringed. The results are as shown in the table below.

Time of the day	Amount of sugar in grammes per $16cm^3$ piece of bark	
	Normal stem	Ringed stem
0645	0.78	0.78
0945	0.80	0.91
1245	0.81	1.01
1545	0.80	1.04
1845	0.77	1.00
2145	0.73	0.95
0045	0.65	0.8

a) Using the same axis, plot a graph of sugar against time. (6 marks

b) At what time was the amount of sugar highest in the:

i) Ringed stem.....(1 mark) ii) Normal stem.....(1 mark)

c) i) How much sugar would be in the ringed stem if it was measured at 0345hours? (1 mark) ii) Give reasons why there was sugar in the stems of both trees at 0645hours. (2 marks) d) Account for the shape of the graph for the tree with ringed stem between:

i) 0645 hours and 1545 hours. (3 marks) ii) 1545 hours and 0045 hours. (2 marks)

e) Name the structures in the phloem that are involved in the translocation of sugars. (2 marks)

a) Other than sugars, name **two** compounds that are translocated in the phloem. (2 marks)

7.

a) State the causes of air pollution (5marks)

b) Describe how air pollutants affect organisms hence state how air pollution can be alleviated (15mks)

8. Describe how a bony fish like tilapia is adapted to locomotion in aquatic habitat. (20mks)

PAPER 3

1. You are provided with the following materials and reagents.

A straight portion of raw pawpaw, labelled **D**

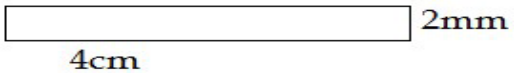
Two petri dishes, a scalpel/sharp razor blade, two beakers containing liquids **A** and **B** A measuring cylinder, A stop watch/access to a wall clock, Means of labeling

(i)Label the two petri dishes, **A** and **B**

(ii) Place $30cm^3$ of liquid **A** into petri dish **A** and $30cm^3$ of liquid **B** into petri dish **B**

(iii)Using the scalpel, prepare four thin, straight flat strips from the raw pawpaw peel

(iv)Each strip should measure about 4cm by 2mm as illustrated below



(v) Immerse two strips in petri dish **A** and the other two in petri dish **B** and leave the set ups undisturbed for 10 minutes.

(a) (i) State your observations in petri dish **A** and **B** after 10 minutes

Petri dish **A** (1mk)

Petri dish **B** (1mk)

(ii) Account for the observations made in (a) (i) above

Petri dish **A** (2mks)

Petri dish **B** (2mks)

(b) Describe the nature of liquids **A** and **B** in relation to the sap in the pawpaw peel used in the experiment

Petri dish **A** (1mks)

Petri dish **B** (1mks)

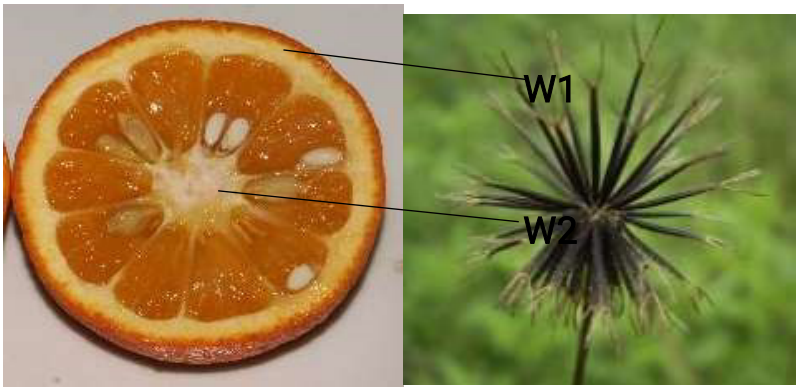
(c) With reference to the observations made, compare the nature of the outer and inner surfaces of the

pawpaw peel (2mks)

(d) (i)Name the cell structure responsible for the observations made in this experiment (1mk)

(ii) Explain how the cell structure named in (d) (i) above works to bring about the observations made (1mk)

2. Study the specimens provided then answer the questions below.



(a)Name the parts labeled **U1, W1, W2** and **V3** (4mks)

U1……

W1……

W2……

V3……

(b)(i) Suggest the mode of dispersal of the specimen labeled U (1mk)

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

(c) (i) Suggest the mode of dispersal of the specimen labeled X. (1mk)

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

(d) The Photograph shown below was taken from a tree bark. Study it then answer the questions.

(i). Name organism labeled Q…… (1mk)

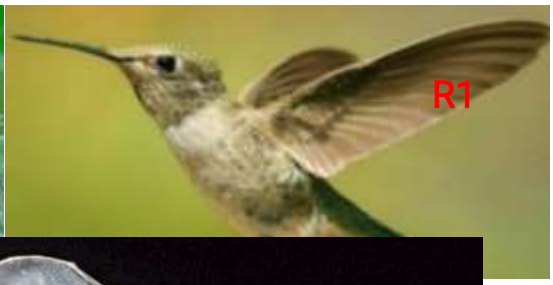
(ii) Name two organisms that make up Q…… (2mks)

(iii)Suggest the feeding relationship between the identified organisms in b (i) above explaining the role of each in the relationship. (1mk)

(iv) Identify the two possible Kingdoms represented by organism Q. (2mks)

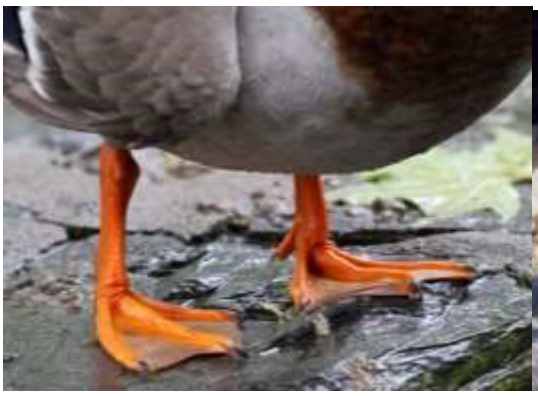
3. Study photographs shown below then answer the questions.

Q



R

S



A 1

B1

C1

(a) State the type of evolution represented by structures **Q1**, **R1** and **S1**. (1mk)

b) Explain the type of evolution identified in (a) above. (1mk)

(c) Give the evolution term used to describe structures;

(i) **Q1, R1** and **S1.** (1mk)

(ii)**A1**, **B1** and **C1.** (1mk)

d). what type of evolution is illustrated by the limbs (**A1**, **B1** and **C1**)? (1mk)

e). (i) Name classes for organisms labeled Q, **R** and **S.**

Q……(1mk

R……(1mk

S……(1mk)

(ii)Give two observable reasons for your answer for class **S.** (2mks)

(f) (i) Suggest the diet of animals **B** and **R.**

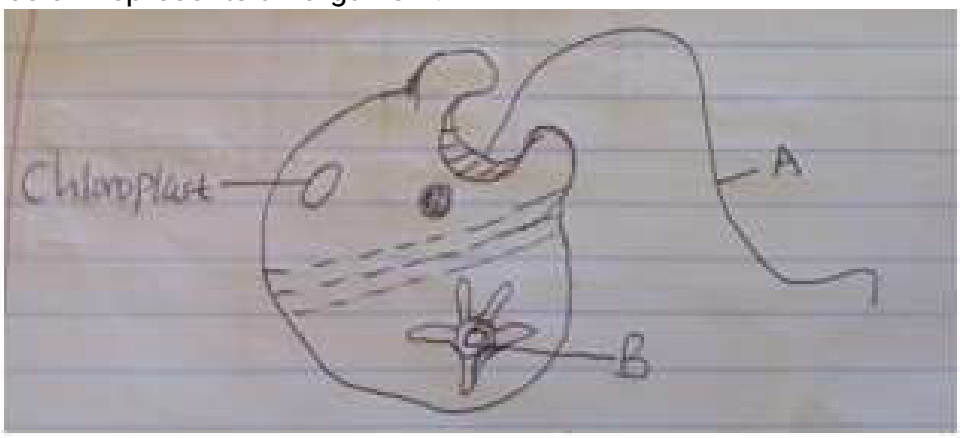
B…… (1mk)

R…….. (1mk)

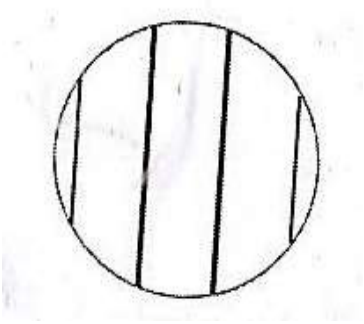
(ii) How is beak of animal **B** adapted to its function? (2mks)

KCSE PREDICTION 5 2019 PAPER 1

1. Identify the structure of the cell that performs the following functions
   a) Synthesis of ribosome (1mk)
   b) Regulate exchange of substances in and out of the nucleus (1mk)
   c) Formation of spindle fibres (1mk)
2. State the importance of the following processes
   a) Ultra-filtration (1mk)
   b) Selective reabsorption (1mk)
3. The diagram below represents an organism.



   (i) In which kingdom does the organism belong (1mk)
   (ii) Give a reason for your answer (1mk)
   (iii) Name the structure labeled A (1mk)
4. What difference would you expect to see between pea seedlings grown for ten days in total darkness and pea seedlings grown in light for the same period of time (3mks)
5. A form one student trying to estimate the size of onion cells observed the following on the microscope's field of view



(i) Define the term resolving power (1mk)
(ii) If the student counted 20cells across the field of view, calculate the size of one cell in micrometers (2mks)

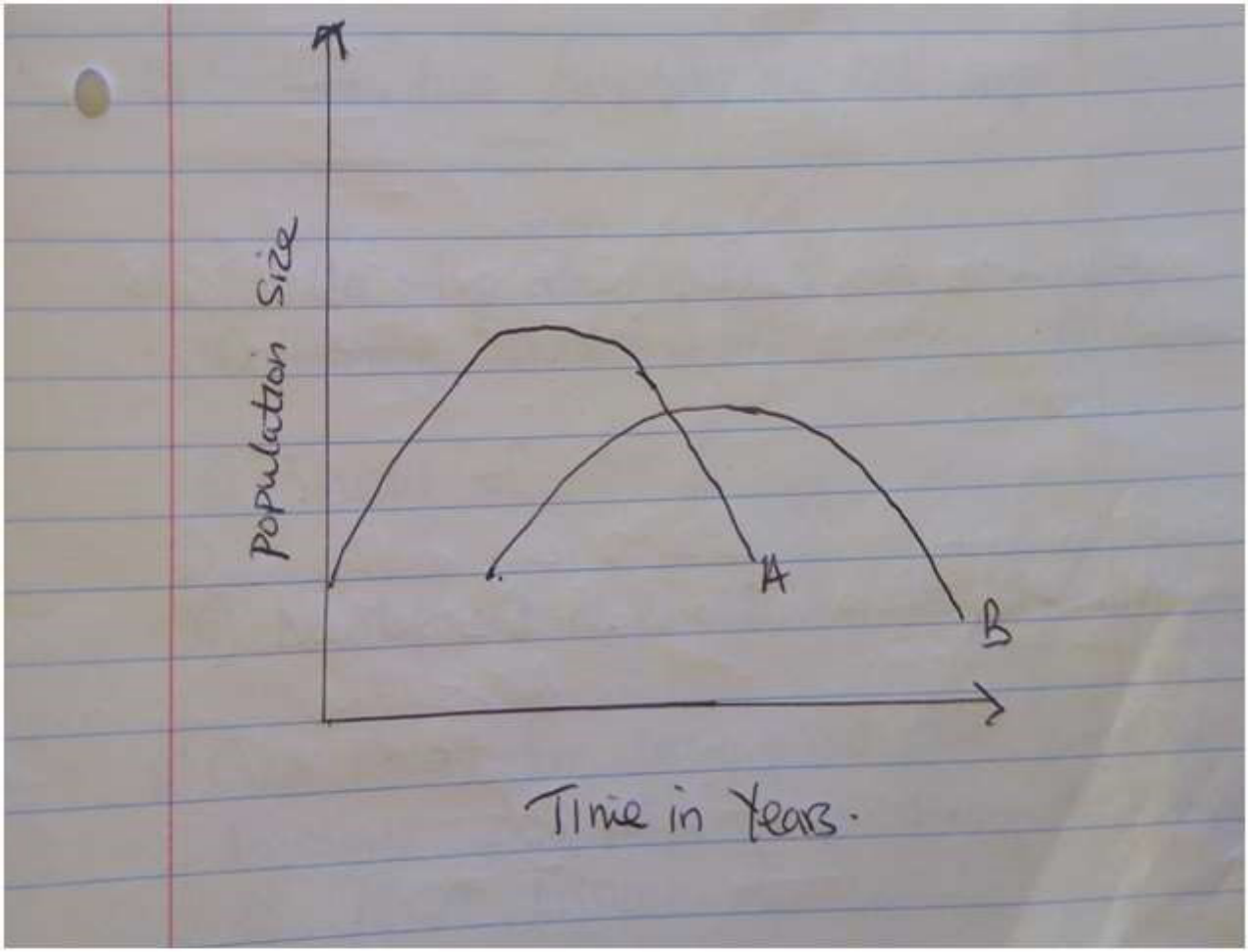
6. During a strenuous exercise, the chemical process represented by the equation below takes place in human muscles

$C_6H_{12}O_6 \longrightarrow 2CH_3CH(OH)COOH + 150KJ$

(Glucose) (Substance X) (Energy)

a) What is the name of this process (1mk)
b) Name the substance X (1mk)
c) Explain what happens in the body when substance X accumulates in the muscle in high amounts (1mk)

7. State the effect of damping untreated sewage into a river (3mks)
8. (a) What is meant by double fertilization in plants (2mks)
(b) Mention two development stages that take place in the ovary of a flower after fertilization. (2mks)
9. What is meant by the following terms
a) Hybrid vigour (1mk)
b) Polyploidy (1mk)
10. Name the causative agent of the following human diseases
a) Malaria (1mk)
b) Typhoid (1mk)
11. The graph below shows relationship between two species a and B. species B is a predator feeding on species A



a) When the predators are too efficient, what happens to both populations? (1mk)
b) If predators were entirely removed, what might happen to the prey population? (3mks)
12. Define the following terms
(i) Test cross (1mk)
(ii) Phenotype (1mk)

(iii)Dominant gene (1mk)

13. State two functions of cell sap
(2mks)

14. State the name given to the study of:
a) Structure of tissues (1mk)
b) Study of fishes (1mk)
c) Development of animals from egg to adult (1mk)

15. Give reasons for carrying out the following procedures when preparing temporary wet mounts of plant tissues.
a) Making thin plant sections (1mk)
b) Adding water on plant section (1mk)
c) Placing a cover slip over the plant sections (1mk)

16. (a) What is diffusion? (2mks)
(b) How do the following factors affect the rate of diffusion?
i) Diffusion gradient (1mk) ii) Surface area to volume ratio (1mk) iii) Temperature (1mk)

17. The table below shows the concentration of sodium and iodine in sea water and cell sap of a plant.

	Sodium ion concentration	Iodide concentration
Sea water	250	35
Cell sap	100	550

If the plant was sprayed with a chemical that inhibit respiration:
(i) Which of the two ions uptake will be affected (1mk)
(ii) Give a reason for your answer in (i) above (1mk)

18. What is the role of vascular bundles (3mks)

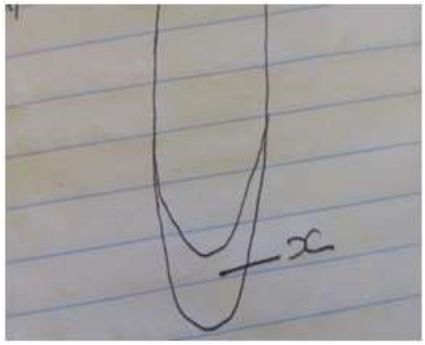
19. Describe what happens during light stage photosynthesis
(3mks

20. What happens to the end products of photosynthesis
(4mks)

21. (a) Name one appropriate food substance for each of the following enzymes
(i) Ptyalin (1mk)
(ii) Pepsin (1mk)
(b) State two symptoms of Beri-Beri (2mks)

22. How is the human stomach adapted to
(i) Protein digestion (3mks)
(ii) Churning (1mk)

23. the diagram below represents the region of a root tip



a) Name the three regions above X in ascending order (3mks)
b) State the function of the part labeled X (1mk)

24. (a) Name the antigens that determine human blood group (2mks)

(b) Explain three protective role of mammalian blood (3mks)

25. How are mitochondria adapted to their functions (2mks)

26. State two ways in which anaerobic respiration is applied in industries (2mks) **PAPER 2**

SECTION A (40 MARKS) Answer all questions in this section

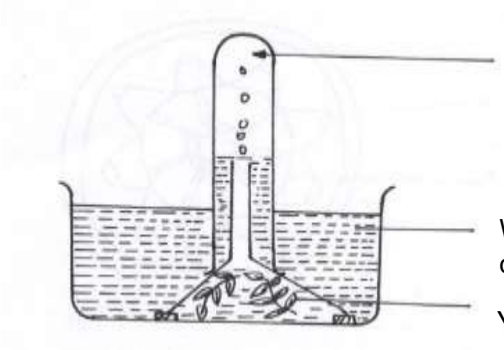
1. A cross between a red flowered plants and white flowered plants produced plants with pink flowers. Using letter R to represent the gene for red color and W for white.

a) What were the parental genotypes? (2mks)

b) Work out the cross between f1 generations (4mks)

c) State the phenotypic and genotypic ratios of the f2 generations (2mks)

2. The set up shown was used to investigate a certain process. The set up was left in bright sunlight for 4 hours.



a) State the aim of experiment (1mk)

b) Name X and Y (2mks)

c) Other than sunlight name three factors that would affect the experiment (3mks)

d) State how the identity of gas X could be confirmed (1mk)

e) Explain why submerged water plants was used in the experiment (1mk)

3. (a) What is meant by:

i) Autecology (1mk) ii) Synecology (1mk)

(b) Using the table below, answer the questions that follow

	Number of st ɔmata	
Leaf	**Upper epidermis**	**Lower epidermis**
A	300	0
B	150	200
C	02	13

Suggest the possible habitat of the plants from the leaves were obtained (3mks) A

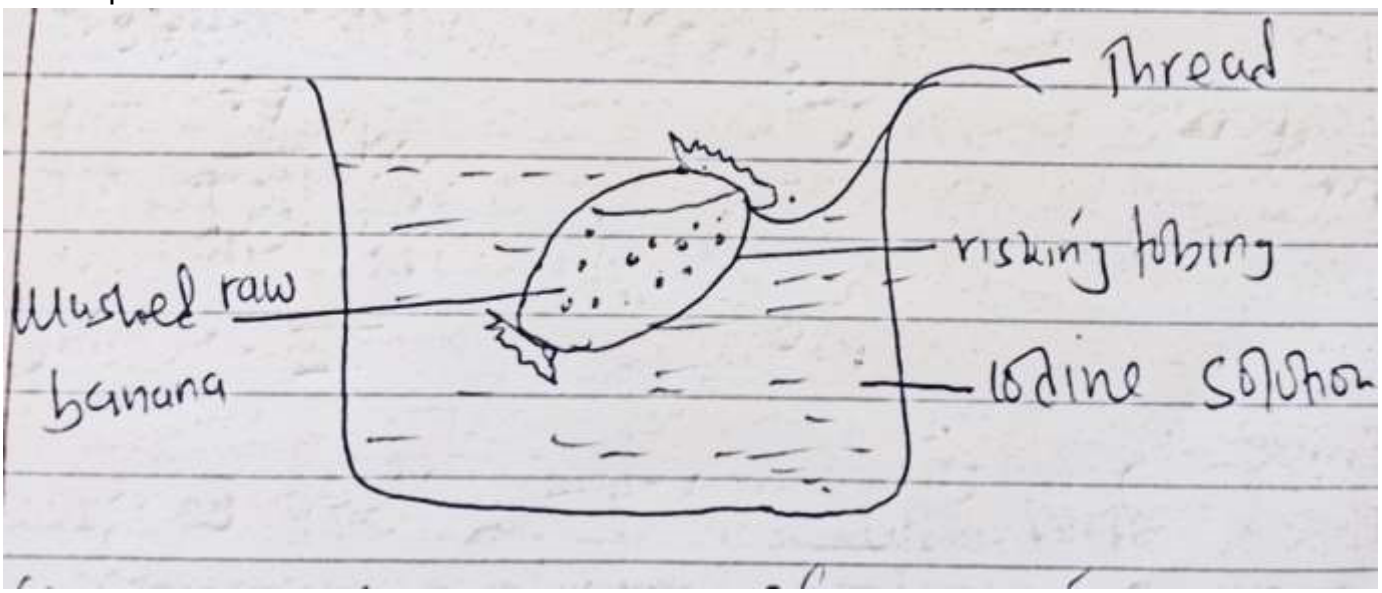
B

C

(c) State the modifications in the stomata of leaf C (3mks)

4. In an investigation, a raw banana was peeled, mashed into a paste and treated as shown in the

set up below.



a) Name the physiological process being investigated (1mk)
b) State the expected observations in the above set up after 30 minutes (2mks)
c) Account for the observations made in (b) above. (2mks)
d) State three role of active transport in human (3mks)

5.

substance	% in blood Plasma	% in glomerular Filtrate	% in urine
Water Protein Urea glucose	100 6.5 0.03 0.1	90 0 0.03 0.1	60 0 1.8 0

a) Why is the concentration of protein in glomerular filtrate and urine zero? (1mk)
b) (i) By how many times is urea more concentrated in urine than in glomerular Filtrate? (1mk) (ii) Explain why there is greater concentration of urea in urine than glomerular filtrate (1mk)

c) Explain why there is no glucose in urine (1mk)
d) State the economic importance of the following plant excretory products
i) Rubber (1mk) ii) Papain (1mk)
e) State two reasons why plants lack complex excretory organs. (2mks)

SECTION B: (40MARKS)

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

6. During germination and growth of cereal, the dry weight of the endosperm, the weight of the embryo and the total dry weight were determined at two days intervals. The results are shown in the table below.

Time after planting	Dry weight of	Weight of embryo	Total dry weight

(days)	endosperm (mg)	(mg)	(mg)
0	43	2	45
2	40	2	42
4	33	7	40
6	20	16	37
8	10	25	35
10	6	33	39

(a) On the same axes, plot a graph of dry weight of endosperm, weight of the embryo and the total dry
weight against time. (8mks)
(b) What was the total dry weight on day 5? (1mk)
(c) Account for the;
i) Decrease in dry weight of the endosperm from day 0 to 10 (2 mks)
ii) Increase in weight of the embryo from day 0 to 10 (2mks)
iii) Decrease in the total dry weight from day 0 to 8
(1mk) iv) Increase in the total dry weight after day 8
(1mk)
(d) State two factors within the seed and two outside the seed that cause dormancy. Inside seed
Inside seed (2mks)
Outside seed (2mks)
(e) Give one characteristic of meristematic cells (1mks)

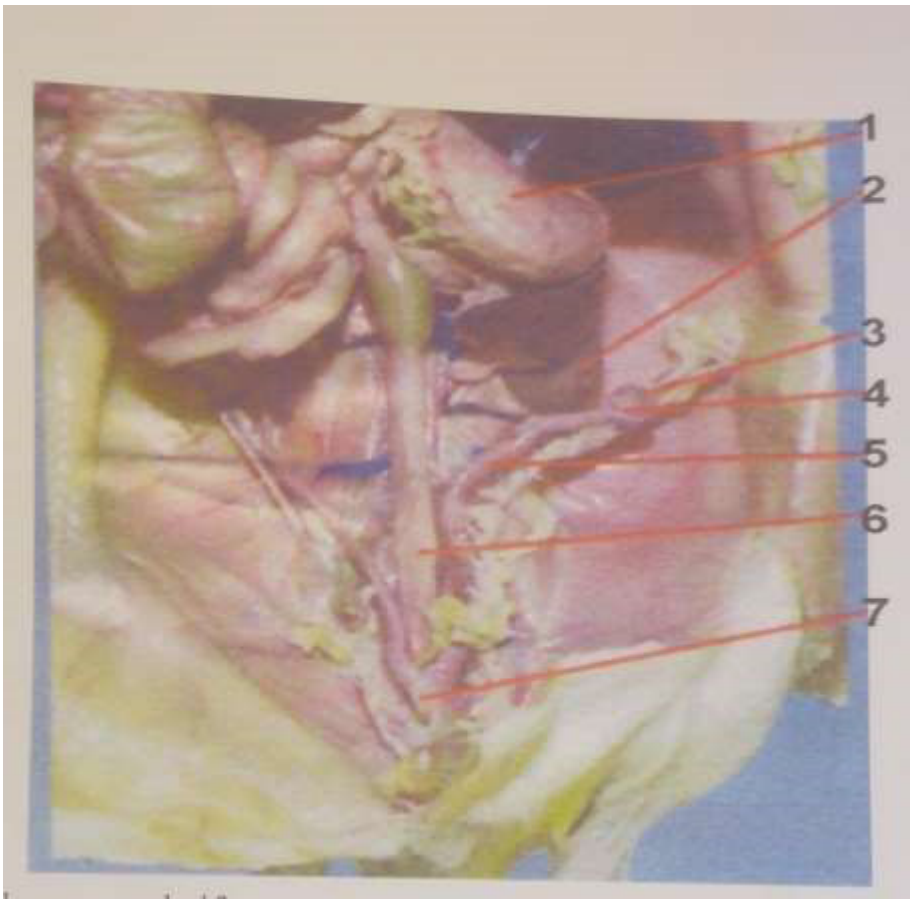
7. (a) Describe the process of fertilization in flowering plants
(15mks) (b) State five adaptive features of red blood cells to their function
(5mks)
8. (a) Explain inspiration in the gills of bony fish (10mks)
(b) Explain the factors affecting the rate of breathing in humans (10mks)

PAPER 3

1. You are provided with solution W. Using the provided reagents; carry out possible food tests to identify food substances present in solution. (14mks)

Food substance	Procedure	Observation	Conclusion

2. Examine the photograph which shows parts of the urogenital system of a female rat and answer the questions that follow. The organ marked 1 is the stomach.

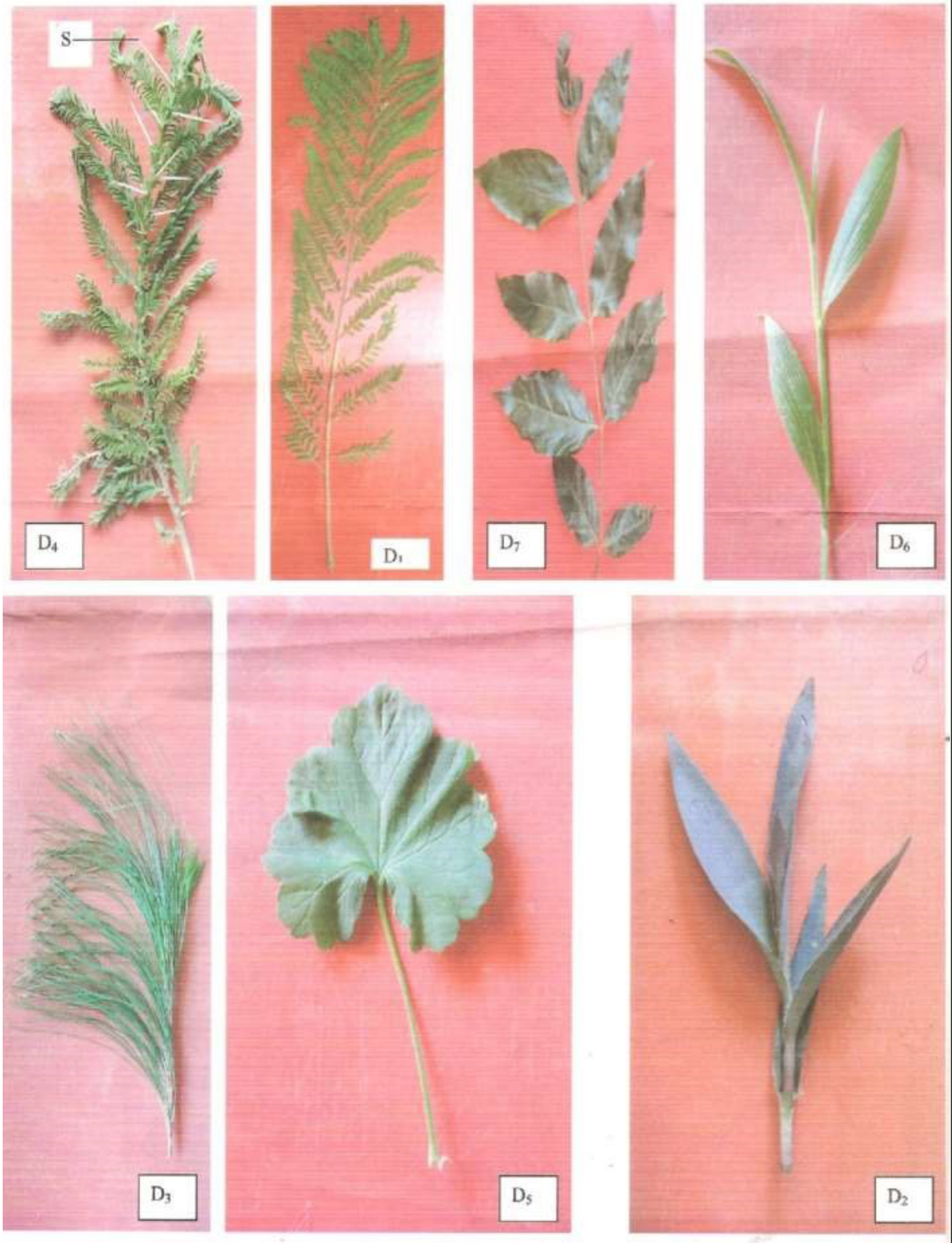


a) (i) Name the organ marked 2 (1mk)
(ii) State two functions of the organ (2mks)
(iii) What is the functional unit of the organ in (a)(i) above (1mk)
b) (i) Identify and name each of the organs marked 3 and 4 (2mks)
(ii) State two functions of the part marked 4
(2mks) c) (i) Identify the organs marked 5
(2mks)
(ii) Explain two functions of the organ named in c (i) above.
(2mks) d) The organ marked 6 is the large intestine. State three function of the large intestine.
(3mks)

3. You are provided with seven specimens of plants. They are labeled D1, D2, D3, D4, D5, D6, and D7. The dichotomous key

1. a) Leaves needle like ……..go to 2
   b) Leaves broad …….. go to3
2. a) Leaves arranged in clusters on stem…….. Pinnacea
   b) Leaves not arranged in clusters on stem ……..Araucariaceae
3. a) Leaves compound……. go to 4
   b) Leaves simple…… go to 7
4. a) Leaflets pointed at the end ……..go to 5
   b) Leaflets rounded at the end……go to 6
5. a) Leaflets attached to many small stalks that join the main one ……..Mimosaceae
   b) Leaflets attached to one stalk ……Rosaceae
6. a) Leaflets attached to many small stalks that join the main one…….. Bignonaceae
   b) Leaflets attached to one stalk ……Compositae

7. a) Leaves green ……go to 8
   b) Leaves purple …….. go to 9
8. a) Leaves parallel veined ……..Graminae
   b) Leaves net veined …….. Geranaceae
9. a) Leaves parallel veined ……Commelinaceae
   b) Leaves net veined ……Euphorbiaceae



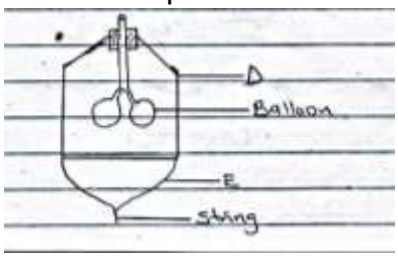
a) Use the dichotomous key to identify the taxonomics group of each of the seven specimens in the photographs provided. (7mks)

Specimen	Steps followed	Identity
Dl		
D2		
D3		
D4		
D5		
D6		
D7		

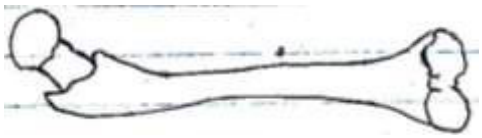
b) (i) Suggest the possible habitat that specimen D4 is adapted to (1mk)
(ii) Name one observable feature that adopts D4 to the habitat you have mentioned in (b) (i) above (1mk)
(iii)Give a reason for your answer in (b) (i) above (1mk)
(iv)State the importance of the structure labeled S in specimen D4 (1mk)

KCSE PREDICTION 6 2019 PAPER 1

1. State the functions of the following parts of a microscope.
a) Objective lens. (1mk)
b) Diaphragm. (1mk)
2. State one use for each of the following apparatus in the study of living organisms.
a) Pooter (1mk)
b) Pitfall trap. (1mk)
3. Below is the dental formula of a mammal. i $\frac{0}{4}$, c $\frac{0}{0}$,pm $\frac{3}{3}$,m $\frac{2}{3}$
a) What is the total number of teeth? (1mk)
b) i) What is the mode of feeding in the mammal? (1mk)
ii) Give one reasons for your answer above.
(1mk)
4. The diagram below represents a model used to demonstrate breathing in mammals.



a) Name the mammalian structure represented by the parts labeled D and E.
(2mks)
b) State the observation made when the string is pulled downwards. (1mk)
c) Explain the observation in (b) above. (1mk)
5. $5C_{51}H_{98}O_6 + 145CO_2 \rightarrow 102CO_2 + 98H_20$ + ENEGY
The above equation shows an oxidation reaction of food substances.
a) Determine respiration quotient of the oxidation of food substances. (2mks)
b) Identify the food substances. (1mk)
6. The diagram below represents a mammalian bone.

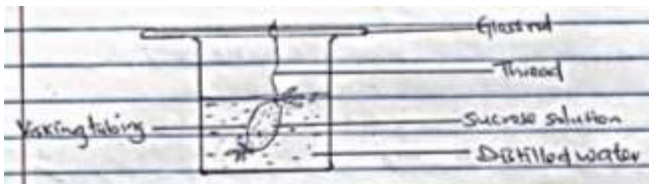


a) Name the bone. (1mk)
b) Name the type of the joint formed by the bone at its interior end with adjacent bone. (1mk)
7. When are two organisms considered to belong to the same species? (2mks)
8. A shoot of seedling exposed to light one side bends towards the sources of light as it grows.
a) Name the response exhibited by the shoot of the seedling. (1mk)
b) Explain how the bending towards the sources of light occurs. (2mks) 9.
a) State two structural differences between DNA and RNA. (2mks)

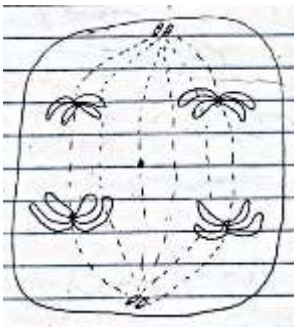
DNA	RNA

b) State two fuctions of DNA molecules. (2mks)
10. Suggest two reasons why green plants are included in a fish aquarium. (2mks)
11. a) i) What is meant by the term vestigial structures? (1mk)
ii) Give examples of a vestigial structure in human. (1mk)
b) Name the type of evolution illustrated by:
i) Hind limbs of birds. (1mk) ii)
Wings of birds and insects. (1mk)

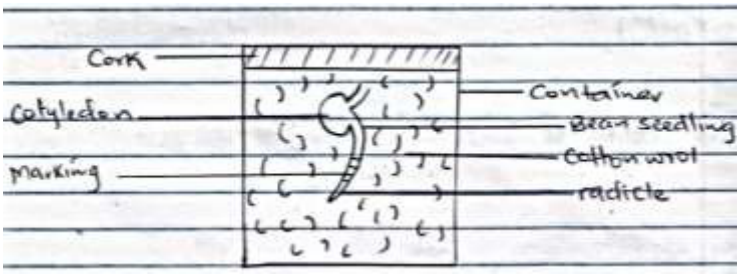
12. Name two process in the human body in which homeostasis is involved. (2mks)
13. a) Explain the absence of the following components in urine of a healthy person.
i) Glucose (1mk)
ii) Plasma protein (1mk)
b) What is the name of the hormone responsible for regulating the level of sodium ions in blood of a mammal. (1mk)
14. a) State two primary functions of the root to plant. (2mks)
b) Explain the significance of transpiration in plants. (2mks)
15. An experiment was set up as shown below.



The set up was left for 30minutes.
a) State the expected results. (1mk)
b) Explain your answer in (a) above. (3mks)
16. The diagram below represents a stage during cell division.



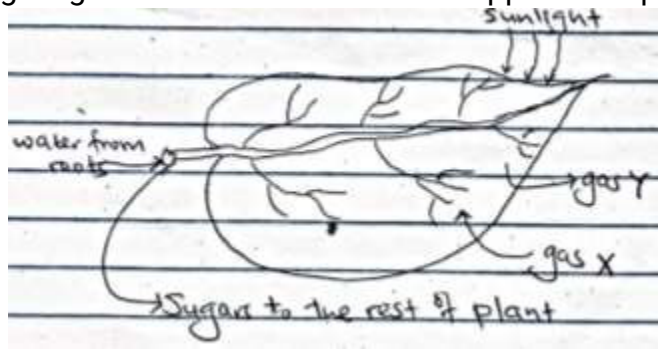
a) i) Identify the stage of cell division. (1mk)
ii) Give two reasons for your answer in (a) (i) above. (2mks)
17. Give two reasons in each case why support is necessary in:
i) Plants (2mks) ii) Animals (2mks)
18. Which structure in the ear detects.
a) Sound waves. (1mk)
b) Change in position. (1mk)
19. A students set up and experiment as shown in the diagram below.



a) i) What was being investigated in the experiment? (1mk)
ii) Draw a diagram to indicate the expected results of the experiment after seven days. (1mk) iii) Why was it necessary to have wet cotton wool in the container. (1mk)
b) What is the role of cotyledons in a germinating seed? (1mk)
20. An individual is of blood group B positive.
a) Name the antigens in the individuals' blood. (2mks)
b) Give the reason why the individual cannot receive blood from blood group A donor. (2mks) 21. a) Explain how the following prevents self-pollination.
i) Dioecism. (1mk)
ii) Self-sterility (1mk)
c) What is the role of pollen tube in the plant fertilization? (1mk)
22. To estimate the population size of mosquitoes in Nyansionga village, visting researchers caught 400 mosquitoes which they marked and released. After 24 hours 200 mosquitoes were caught out which 80 had the marks.
a) What is the name given to this method of estimating the population size. (1mk)
b) Estimate the population size of the mosquitoes in the village. (2mks)
c) State one assumption that was made during the investigations. (1mk)
23. Name the tissue in plants responsible for.
a) i) Transport of water and mineral salts. (1mk)
ii) Primary growth. (1mk)
b) State two ways in which the root hair is adapted to its functions.

(2mks)

24. The following diagram of a leaf shows what happens in a plant leaf during photosynthesis.



a) State one way in which leaves are adapted to absorbs light. (1mk)
b) Name the gases labeled **X** and **Y**. (2mks)

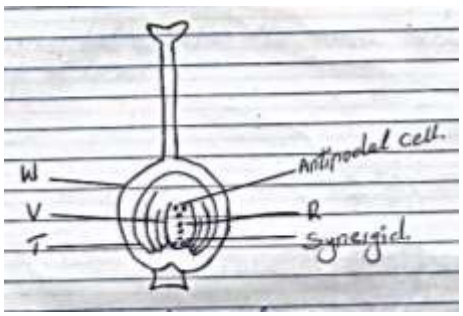
25. State the functions of the following cell organelles.
a) Golgi apparatus. (2mks)
b) Ribosomes (1mk)

26. Explain why it is an advantage for plant to store carbohydrates in form starch rather that as glucose.
(2mks)

PAPER 2

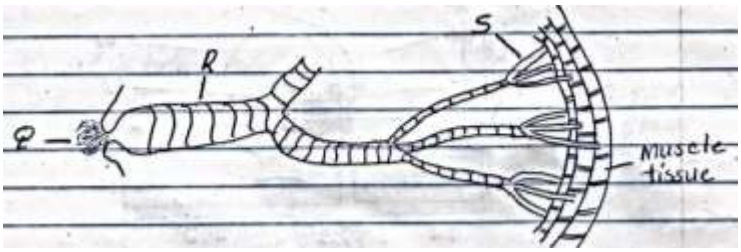
1. In a certain plant species which is normally green, a recessive gene for colour (n) causes the plant to be white in colour. Such plants die at an early stage. In the heterozygous state, the plants are pale green in colour but grow to maturity.
a) Give a reason for the early death of the plant with homozygous recessive gene.
(2mks)
b) If a normal green plant was crossed with the pale green plant, what would be the genotype of the first filial generation (f1 generation) ? Show your working? (4mk)
c) If heterozygous plants were self –pollinated and the resulting seed planted, work out the proportion of their offspring that would grow to maturity.
(2mks)

2. The diagram below illustrates the structure of the female parts of a flower.



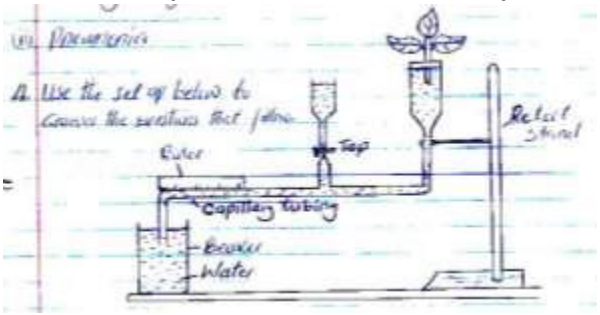
a) Name the part labeled W. (1mk)
b) Describe what happens when the pollens tube enters the structures labeled V. (4mks)
c) What do the structures labeled R and T develop into after fertilization? (2mks)
d) Name the flower part that produces the male gametes. (1mk)

3. The diagram below shows the gaseous exchange system of a locust.



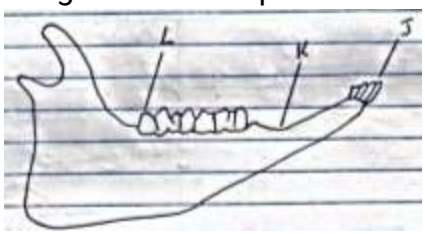
a) Name the structure labeled Q. (1mk)
b) State the function of the part labeled R. (1mk)
c) How is the part labeled S structurally adapted to its function? (2mks)
d)Identify the structure that perform the same function as one illustrated above in . (2mks) I.Amoeba
II.Fish
e)Name the causative agents for the following respiratory Diseases (2mks) i) Whooping Cough.
ii) Pneumonia.

4. Use the set up below to answer the questions that follow.



a) What process was being investigated? (1mk)
b) i) State one precaution that should be taken when setting up the experiment. (1mk)
ii) Give a reason for the precaution stated in b(i) above. (1mk)
c) State three environmental factors that influence the process under investigation. (3mks)
d) Give two importance of the process named in (a) above (2mks)

5. The diagram below represents the lower jaw of a mammals.



a) Name the mode of nutrition of the mammal whose jaw is shown. (1mk)
b) State one structural and one functional differences between the teeth labeled J and L. (2mks)
c) i) Name the toothless gap labeled K. (1mk)
ii) State the function of the gap. (1mk) d) Name the substance that is responsible for hardening of teeth. (1mk)
e) Distinguish between the terms homodont and hererodont. (2mks) ***SECTION B: 40MKS***

4. An experiment was carried out to investigate plasmolysis in onion epidermal cells. The epidermal cells were placed in different concentrations of sodium chloride solution. The percentage of plasmolysis cells was determined after 30 minutes. The results were as shown in the table below.

Salt concentration ($g/100cm^{3)}$	Onion epidermal cells plasmolysis(%)
0.35	0
0.40	15
0.45	30
0.50	69
0.55	82
0.60	91
0.65	100

On the grid provided plot a graph of:

i. Plasmolysis epidermal cells against salt concentration. (6mks)

ii. At what concentration of salt solution was the proportion of plasmolysis cells equal to non-plasmolysis cells. (1mk)

iii. State the salt concentration at which 45% of the cells are plasmolysed. (1mk) b) Account for the results obtained at:

i) 0.35% salt concentration. (3mks) ii) 0.65% salt concentration. (3mks) c) i) What does the term plasmolysis mean? (1mk) ii) Name the process by which plasmolysis is reversed. (1mk)

d) Does plasmolysis occur in animal cells. Explain (2mks)

e) What is the relationship between molar concentration of the salt solution and the percentage of plasmolysis cells. (2mks)

5. a) i) Distinguish between epigeal and hypogeal germination. (1mk)

ii) Why is oxygen necessary in the germination of seeds. (2mks)

b) State two factors that cause seed dormancy. (2mks)

c) Describe the role of hormones in the growth and development of plants. (15mks) 8. How is the human eye adapted to its function. (20mks) **PAPER 3**

1. You are provided with specimen labeled **K** make transverse section of the specimen using the scalpel provided.

a) Draw a well labeled diagram of the section. (3mks)

b) i) What type of placentation is displayed by the above specimen. (1mk)

ii) Identify the method of dispersal of the above specimen. (1mk)

iii) Give a reasons for your answer in b(ii) above. (1mk)

c) Squeeze the juice out of the specimen provided and carryout food test using the reagent provided. (12mks)

Food substance	*procedure*	*observation*	*conclusion*
Starch			
Proteins			
Reducing sugars			
Vitamin C			

2. You are provided with specimens **Q** and **S**.

a) With reasons state the class to which each at the specimen belong. (4mk)

b) State the type of germination exhibited by specimen Q, S.
(2mks)

c) Cut a transverse section of the stem of specimen **Q**. Using a hand lens draw a plan diagram of the section. (4mks)

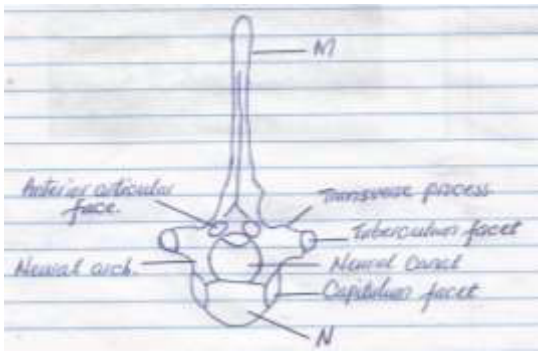
d) i) Which of the seedlings may form swellings on the roots later in their life? (1mk)

ii) Name the organism that are found in the swelling and give their roles. (2mks)

Organism ……..

Role ……

3. i) The diagram below shows a mammalian vertebra.



a. Name the parts labelled : M ,N (2mks)

b. State one function of the neural canal. (1mk)

c. Name the region of the body from which the bone was obtain. (1mk)

d. Which bone articulates (is fused) at the capitulum and tuberculum facets. (1mk)

ii) Below is a photograph of specimen L.

With reasons name the phylum and the class to which the specimen belongs.

KCSE PREDICTION 7 2019 PAPER 1

1.Name the class to which the following organisms belong. [2mks]

[i] Spider ……..

[ii] Bean plant……

2. Give a reason why coarse adjustment knob should not be used when viewing with high power objective lens. [1 mk]

3. a) State **two** functions of an electron microscope. (2 marks)

b)A Student was examining cells from an unidentified rabbit organ under an electron microscope and found that most cells are rich in rough endoplasmic reticulum and golgi bodies .What conclusion can you make concerning the organ .[2mks]

4.. A student dropped a small piece of fresh liver in a beaker containing hydrogen peroxide. A lot of fizzling and frothing was observed.

a. Name the gas produced. [1mk]

b. write the word equation for the reaction above. [1mk]

5. Compare the composition of blood in umbilical artery and umbilical vein. [2mks]

6. Give a reason why pre mature baldness tuft of hair in the nose and ear are characteristics found in males only. [1mk]

7. Distinguish between osmotic pressure and osmotic potential. [2mks]

8.. State **two** ways in which one can investigate the rate of transpiration in plants. [2mks]

9. What is the effect of eating a meal with too much salt to urine production in human. [2mks]

10. Name the blood vessel that links arterioles with venules. [1mk]

b. State **two** ways in which the blood vessel named in [a] above is adapted to its functions. [2mks]

11. (i) What is a dichotomous key?
(1 mark)

(ii) State **two** characteristics of class Arachnida. (2 marks)

12. Outline **two** physiological conditions that may increase energy required per day in a woman. [2mks] 13. Tongue rolling is dominant over the inability to roll the tongue. In a family both the father and mother can roll their tongue of their two children one is a roller and the other is a non-roller. Use letter R to represent the tongue rolling gene.

a. Write the possible genotypes of. [3mks]

i. father ii.
mother

iii. non –roller child

b) Name the type of variation exhibited in the above case. [1mk]

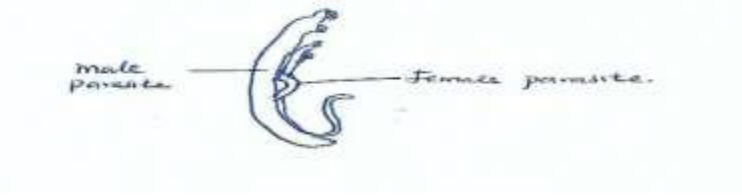
4. Distinguish between the terms protandry and protogyny as used in reproduction in plants. (2 marks)

15. A person of blood group A cannot receive blood from a person of blood group B. Explain. [2mks]

16. State **two** most significant factors that favour exponential growth of a population in any given habitat.

17. State **two** economic importance of bacteria in nature. (2 marks)

18. A patient blood was found to have the parasite below:



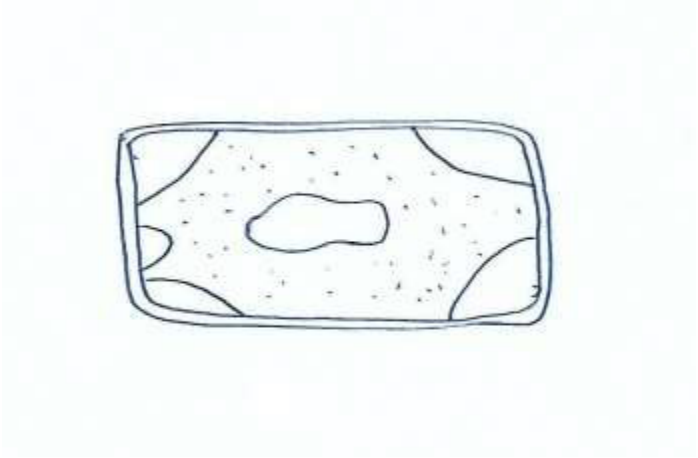
a.Name the parasite; [1mk]

b. Name the disease the patient was suffering from; [1mk]

c. State **three** ways the above disease can be controlled. [3mks] 19. A human egg is described as haploid.

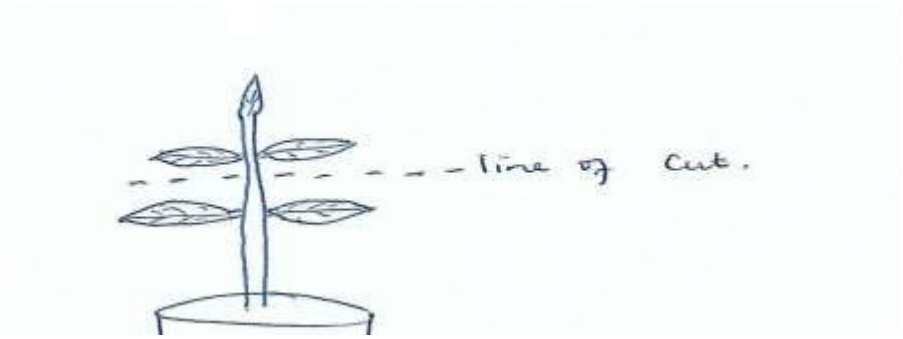
i.what is meant by the term haploid. [1mk] ii. What is the importance of eggs being haploid? [1mks]

20. Below is a diagram of a plant cell



a. what name is used to describe such a cell. [1mk]
b. Describe what has happened to the cell [3mks]
21. Explain how each of following affect enzyme controlled reaction;

i. Temperature (2mks)
ii. pH (1mk)
.....
22. Name the cartilage found in between vertebrae of vertebral column [1mk]
b. State **two** functions of the cartilage named in [a] above [2mks]
23. State **two** differences between smooth muscles and skeletal muscles [2mks]
24. Give the difference between pyramid of biomass and pyramid of numbers [2mks]
b. Why is pyramid of biomass a better method of representing ecological relationships in habitats [1mk]
25. Explain why an athlete pants heavily after sprint race [2mks]
26. In an experiment a shoot tip of a young tomato plant was decapitated as shown below



a. State the expected results after two weeks [1mk]
b. Give a reason for your answer in [a] above [2mks]
27. State the importance of fossils as evidence of organic evolution. [2mks]
28. State the importance of the following features in a respiratory surface. [2mks] i. moist . thin wall
29. When seedlings are grown in the dark, they become tall with long internodes, yellow in Colour and weak.
a. What name is used to describe the phenomenon. (1mk)

c. Explain the observation made above:(2mks)

30. a) What is glycolysis (1 mark)

b) Where in a cell does glycolysis occur. (1 mark)

C)Explain why patients who cannot feed orally are given glucose in a drip. (1 mark)

31.State the function of the following structures in the human ear.

(a) Semi – circular canals. (1mark)

(b) Eustachian tube. (1mark)

32. The table below shows some physiological changes observed in a person in two different regions. The results were taken after the person stayed in each region for 2 weeks.

Physiological change	Region I	Region II
Heart beat per minute	80	71
Breath	Very deep	Average
Breathing rate	fast	Average

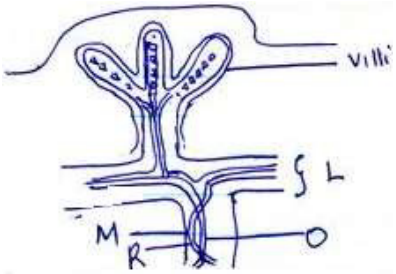
a) Which one of the regions was likely to be at 4,000M above sea level? Give a reason for your answer.

(2 marks)

b) Why was it necessary to take results after a duration of 2 weeks? (1marks)

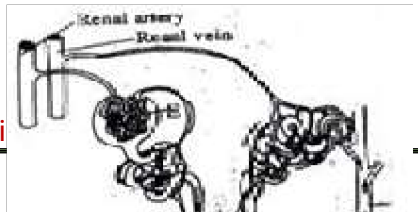
PAPER 2

1. When pure breeding black guinea pigs were crossed with pure breeding white guinea pigs the offspring had a coat with black and white patches
   a) Using letter G to represent the gene for black coat colour and letter H for the white colour, workout the genotypic ratio of F_2 (5mks)
   b) State the phenotypic ratio of F_2 generation (1mk)
   c) Name the term used when two alleles in heterozygous state are fully expressed phenotypically in an organism. (1mk)
   d) Give an example of a trait in human beings where the condition whose term is named in (c) (i) above expresses itself.
2. The diagram below illustrates the structure of a placenta



a) Name the part labeled L and M (1mk)

b) Explain two functions of the above structure



(2mks)

c) Name one substance that is not allowed to pass through the placenta to the uterus (1mk)

d) State and explain what may happen if the ovaries of a human are removed before and after the first four months of her pregnancy. (3mks)

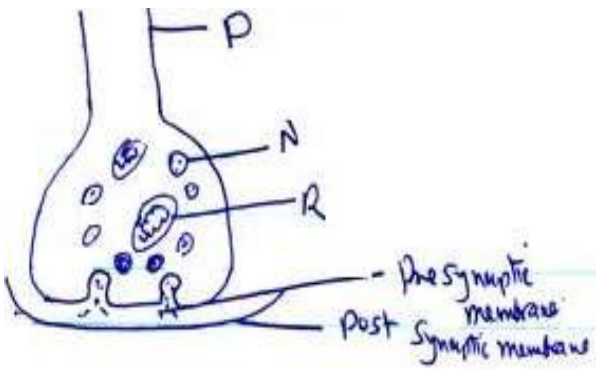
3. The diagram below illustrates the structure of the kidney nephron

a) Name the part labeled E (1mk)

b) How is part labeled F adapted to its function (4mks)

c) State three physiological mechanism of controlling the human body temperature during cold day (3mks)

4. a) Name one type of neurone (1m) b) The diagram shown is a structure of a synapse

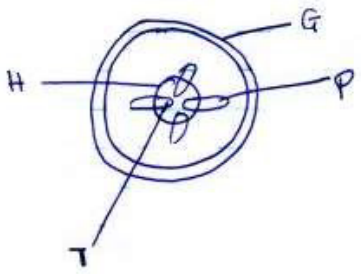


i) Name the parts labeled R and N (2mks)

ii) Give the function of the structure labeled R (2mks) iii) Explain what happens immediately an impulse reaches a synaptic knob (3mks)

c) What is a reflex action (1mk)

5. Below is a cross section through a plant organ. Use it to answer question that follows



a) Giving a reason identify the figure shown above (2mks)
b) State three characteristics of the tissue labeled H (3mks)
c) Name one substance transported by part labeled P (1mk)
d) State the function of part G (1mk)
e) Name the substance used to strengthen part labeled T (1mk)

SECTION B

Question 6 is compulsory and either 7 or 8 in the space provided

6. The data below was obtained by measuring the length of a playing mantis after birth until it was mature

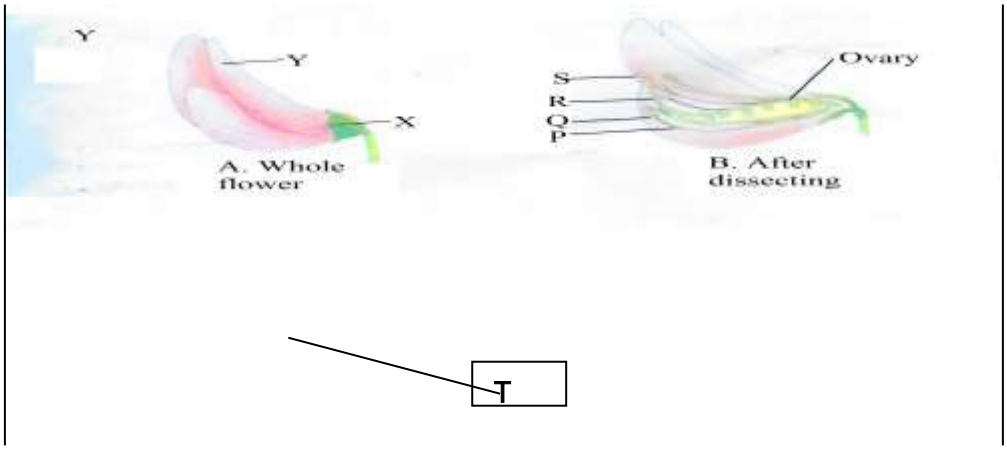
Time in days	0	6	7	14	17	22	25	30	35
Length in mm	3	5	17	18	29	31	52	55	65

a) Draw a curve of length of the insect against time. (6mks)
b) Identify the type of curve drawn (1mk)
c) Explain what happened on day 7 and 15
i) Day 7 (4mks) ii) Day 15 (3mks)
iii) Name the structure responsible for type of growth indicated by the shape of the curve (1mk)
iv) State one function of the structure you named in (c) (iv) above (1mk) d) i) Name the stage demonstrate between day 7 and 17
ii) Give the name of the hormone responsible for the stage named above (1mk) e) How many of such cycles does the organism above undergo before reaching maturity (1mk)
f) Name the phylum of the organism having such growth curve. (1mk)

7. a) State four characteristics of gaseous exchange surfaces (4mks)
b) . Describe the mechanism of gaseous exchange of a mammal. (16 mks)
8. Describe various evidences which show that evolution has taken place. (20mks)

PAPER 3

1 (A) During a field study, a student took a photograph of a flower before and after removing some petals as shown below.



(a) Name the parts marked Q,R,S and X (4mks)
(b) State the functions of parts X ,Yand R . (3mks)
(c) Briefly describe the nature of the corolla of the flower above (2mks)
(d) Which term best describe the nature of the calyx of the flower above (1mks)
(e) (i)What type of ovary does the flower have? (1mks
(ii)Give a reason to support your answer in f(i) above (1mks)
(g) Giving reasons state the agent of pollination in this flower
(i) Agent (1mks)
(ii) Reasons (1mks)

2. You are provided with olive oil, liquids labelled L_1 and L_2 and Irish potato. Label two test tubes A and B. Place 2cm³ of water into each test tube. Add 4 drops of olive oil into each test tube. To test tube labelled A, add 4 drops of liquid L1. Shake both test tubes. Allow to stand for 2 minutes. a) i)Record your observations.
Test tube A (1 mark
Test tube B. (1 mark)
ii) Name the process that has taken place in test tube A. (1 mark) iii) State the significance of the process named (a)(ii) above . (2 mark) iv) Name the:
digestive juice in humans that has the same effect on oil as liquid L1.(1 mark) region of alimentary canal into which the juice is secreted. (1 mark) b) Label two test tubes C and D.
Place 2cm³ of liquid L2 into each. Add a drop of iodine into each test tube.
i) Record your observation. (1 mark
ii) Suggest the identity of L2. (1 mark)
From the Irish potato provided, cut out a cube whose sides are 1cm. Crush the cube to obtain a paste.
Place the paste into a test tube labelled C. Leave the setup for at least 30 minutes.
iii) Record your observations. (1 mark)

iv) Account for the results in (b) (iii) above. (3 marks)
3(a) Name the parts labeled N,X and Z on photograph G. (4mrks)
M……..
N……
X……
X……
(b).State the function of the structures labeled M , N and

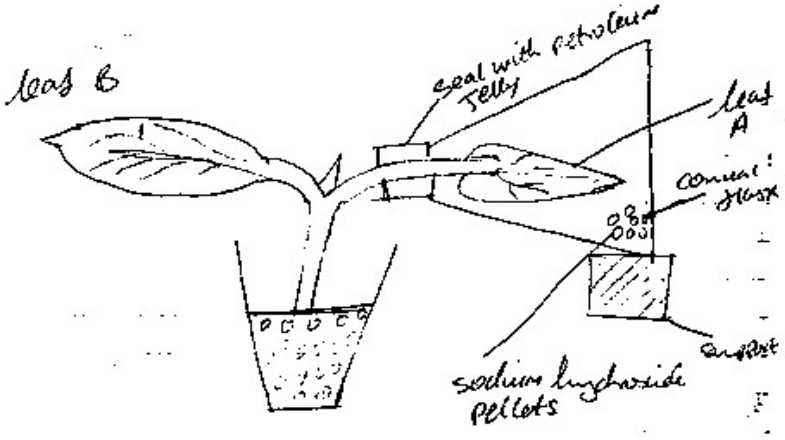
(c). State three functions of the organ labeled Z. (3 mrks)

(d). (I) Name the class to which the dissected animal in photograph G belongs to. (1mrk)

(ii) Give a reason for your answer in c (I) above (1 mrk

KCSE PREDICTION 8 2019 PAPER 1

1. Mention two differences between pollen grain of wind and insect pollinated flowers. (2mks)
2. Below is an experiment set to investigate a factor necessary for photosynthesis.



a) Suggest the aim of the experiment above. (1mk) b) Give a reason for

i. Using sodium hydroxide pellets. (1mk)

ii. Testing leaf B for starch. (1mk) iii. Sealing the mouth of the conical flask with petroleum jelly. (1mk)

3. In a prolonged drought period, forage was scarce. It made animals reach out to higher forage and this way the giraffes got the stretched long necks.

a) What is the term used for a characteristic such as long necks outlined. (1mk)

b) What theory is this? (1mk)

c) State its limitation. Explain (2mks)

4. A girl has blood group O^{+ve}. Give the antigens and antibodies found in her blood.

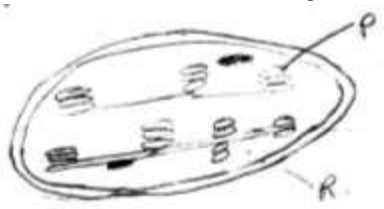
Antigens …….

Antibody ……

5. State two biological reasons why plants shed off their leaves. (2mks)
6. a) A person suffered a brain injury after an accident and lost his memory. Name the part of the brain that was affected. (1mk)

b) State two functions of cerebrospinal fluid. (2mks)

7. Name the gland that secrete hormone aldosterone. (1mk)
8. Describe three physiological process that help in regulation of body temperature in man on a hot day. (3mks)
9. The diagram below shows an organelle in a plant cell.



a) Name the parts labelled P and R. (2mks)

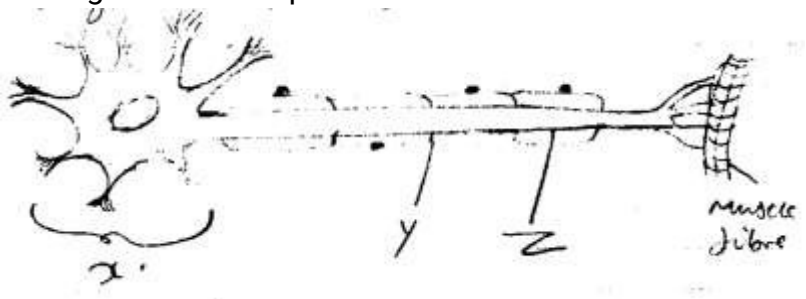
10. How is it possible that organism in kingdom monera and protoctista survive without a circulating system? (2mks)
11. State two ways in which guard cells adapted to their function. (2mks)
12. Counter current flow in fish in advantageous rather than parallel flow. Explain. (2mks)
13. a) What is seed viability? (1mk)
14. State three condition which may lead to loss of viability in a seed. (3mks) Name the cell organelle that performs the following functions in a cell.

i. Stores enzymes (1mk) ii. Synthesis of ribosomes. (1mk)

15. State the changes that take place during inhalation in animals in the following structures. a) Ribcage

b) Diaphragm

16. Explain why removal of predators of a herbivore may in the long run lead to a decrease in herbivore population. (3mks).
17. Why is it not possible to breathe while swallowing. (2mks
18. The diagram below represents a nerve cell.



a) Identify the type of cell. (1mk)

b) Name the parts labelled Y and Z. (2mks) 19. State two sites of secretion of progesterone. (2mks)

20. The figure below represents a type of a muscle.

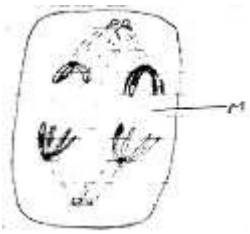
a) Identify the type of muscle. (1mk)

21. Name two parts of the human body where this type of muscle can be found. (2mks)
22. Explain why athletes practicing at high attitude zones have a higher number of red blood cells than those at sea level. (3mks)
23. Name two metallic ions which are involved in nerve impulse transmission. (2mks)
24. a) Other than having many characteristics in common state the other characteristics of a species. (1mk)

b) What is binomial nomenclature? (1mk)

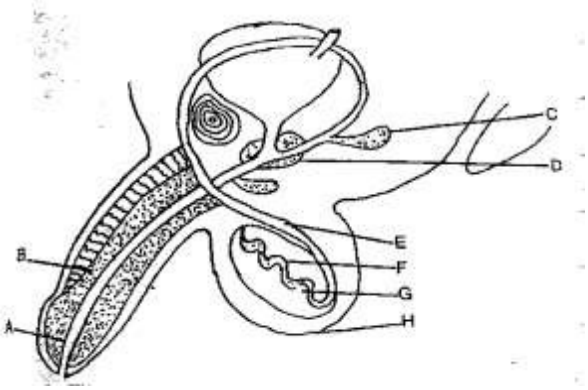
25. a) Name causative agent of each of the following diseases. (2mks) i. Pneumonia ii. Tuberculosis

b) Name the vector that transmit disease causing microorganism for malaria. (1mk) 26. The diagram below represents a stage during cell division.



a) i. Identify the state of cell division (1mk)
ii) Give two reasons for your answer in a) i. above. (2mks)
b) Name the structures labelled M. (1mk)

27. Below is a diagram of male human reproductive organ. Study it and answer the questions that follow.



i. Explain two adaptations of the structure labelled G, to its functional. (2mks)
ii. Explain the role of the gland labeled C. (2mks)

28. Give reasons for carrying out the following procedures when preparing temporary wet mounts of plant tissues.
Making thin plant sections. (1mk)
Adding water on the plant section (1mk)
Placing a cover slip over the plant section. (1mk)

29. In an experiment on respiration a mouse was observed to have inhaled 200cm^3 of oxygen and exhaled
199.75cm^3 of carbon(iv) oxide in ten minutes
a) Calculate the respiratory quotient for the activity in the experiment (2mks)
b) Identify the possible food substance consumed by the mouse. (1mk) State the late of the excess food
named in (b) above in the human body. (2mks)

30. State Mendes first law. (1mk)
b. State two disadvantages of genetically modified plant products. (2mks)

31. State one advantage evolution has given human over must of the other animals. (2mks)

PAPER 2

1. In a breeding experiment, garden peas with axial flowers were crossed with plants with terminal flowers. All the F1 plants were self-pollinated a total of 858 seeds were produced in the F2 generation. Out of the total 651 seeds gave rise to plants with axial flowers.
a) Explain why all the F1 plants had axial flowers. (1mk)

b) i. Use a punnet square to show the genotypes of the F2 offsprings, when the f1 plants were crossed with terminal flowered
plants (use A to represent allele for axial flowers)
(4mks) ii. Determine the genotypic ratio of the F2 offsprings obtained.
(1mk)

c) Name two disorders in humans caused by gene mutations.
(2mks)

2. The table below shows the effect of temperature on the activity of amylase on starch. Six test –tubes each containing a mixture of starch and amylase were placed in water baths maintained at 0°C, 10°C,
20°C, 30°C, 40°c and 50°C, and allowed to stand. Study the table and answer the questions that follow.

Test-tube	Temperature °C	Time taken for starch digestion (min)
1	0	starch still present after 60 mins
2	10	22
3	20	11
4	30	5
5	40	3.5
6	50	Starch still present after 60 mins

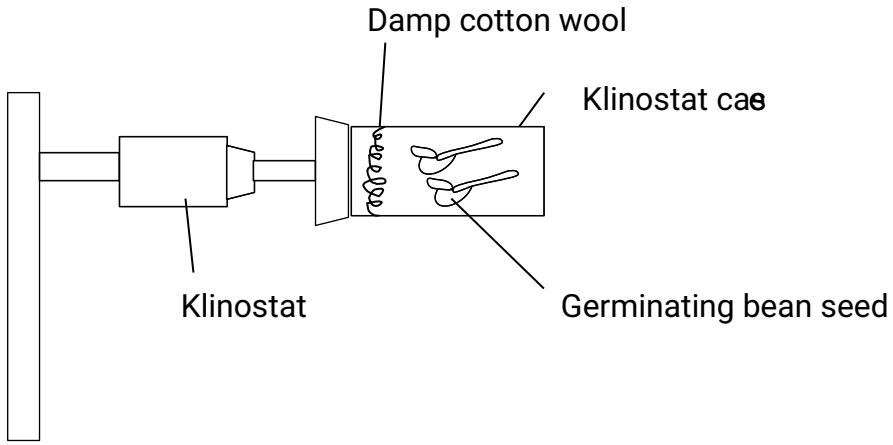
a) How does the temperature affect the action of amylase? (1mk)

b) Give one reason in each case for the results obtained in the tubes kept at
i. 0°C (1mk) ii. 50°C (1mk) iii. 40°C (1mk)

c) Account for the time taken for starch digestion at 0°C. (2mks)

d) State two factors that may affect the rate reaction, other than the factor investigated above.
(2mks)

3. In an experiment to investigate a plant response, the set up shown in the diagram below was used.



a) Name the type of response that was being investigated. (1mk)

b) If the Klinostat was not rotating.
i. State the observation that would be made on the seedlings after three days.
(2mks) ii. Explain the observation in (b) (i) above. (2mks)

c) If the experiment was repeated with the Klinostat rotating
i. State the observation that was made on the seedlings after three days.
(1mk) ii. Give a reason for the observation made on the seedlings. (1mk)

4. The photograph illustrate butterfly at various stages of its development

a) i. On the photograph, name the stages of the life cycle.
(1mk) ii. Using arrows, link the stages of the life cycle in the correct order.
(1mk)
b) i. State two differences between the life cycle of a butterfly and that of a cockroach.
(2mks) ii. State one advantage of the life cycle of a cockroach to itself.
(1mk)
c) i. Name two hormones involved in insect metamorphosis.
(2mks) ii. Identify the type of growth exhibited by the organism named above.
(1mk)

5. The table below shows the percentage concentration of certain substances in blood plasma, glomerular filtrate and urine in a human being at a particular time.

Percentage concentration			
Substance	**Blood plasma**	**Glomerular filtrate**	**Urine**
Glucose	0.023	0.02	0.0
Water	92.70	92.70	96.08
Protein	5.69	0.0	0.0
Urea	0.087	0.098	2.6

a) Explain the likely impact on the composition of urine in case of the following.
i. Vigorous physical exercises. (2mks) ii. A meal rich in proteins (2mks) b) Name the processes responsible for
i. Presence of glucose in the glomerular filtrate
(1mk) ii. Absence of glucose in urine.
(1mk)
c) i. Name the process by which urea is formed in the liver. (1mk)
ii. What is the importance of urea from the body. (1mk)

SECTION B

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

6. In an experiment carried out in a tropical country, carbon (iv) oxide concentration was measured around a plant in open air at two hour intervals for a period of 24hours. The results were as shown in the table below.

Time	Percentage of carbon (iv) oxide (10-4)
3am	3.40
5am	3.60
7am	3.90
9am	3.20
11am	2.95
1pm	2.90
3pm	2.90

5pm	2.92
7pm	3.02
9pm	3.10
11pm	3.20
1am	3.30
3am	3.40

a) Using the data, plot graph of carbon (IV) oxide concentration against time on the grid provided. (6mks)

b) Calculate the rate of change in concentration of carbon (iv) oxide between 4am and 7am. (3mks)

c) Give reasons for the change in carbon (iv)oxide concentration between the following times.
i. 7am and 11am. (2mks)
ii. 12 noon and 4pm iii. 5pm and 5am
d) The experiment was repeated on another day and the results were different.
i. Name two environmental factors that were likely to have affected that results. (2mks) ii. State how each of the factors you have named in (d) i) above could have affected the results. (2mks)

7. a) Describe the process of absorption of water from the soil to the leaves. (10mks)
b) How is the mammalian heart adapted to its function. (10mks)

8. a) Describe how the following vertebrae are adapted to their function.
i. Atlas. (3mks)
ii. Thoracic vertebrae. (4mks)
iii. Lumber vertebrae. (3mks)
b) Explain how xerophytic plants are adapted to their habitat. (10mks)

PAPER 3

1. You are provided with iodine solution, Benedict's solution, visking tubing, test tubes, a beaker and a solution labelled X (shake thoroughly before use)

a) Using the reagents provided test the identity of solution labeled X. (6 mrks)

Foot test	Procedure	Observation	Conclusion

Tie one end of the visking tubing provided with a thread tightly. Measure 5ml of solution X. Pour 5ml of solution X into the visking tubing. Tie the other end of the tubing tightly. Ensure there is no leakage. Rinse the outside of the tubing with distilled water and immerse it with its contents in a beaker containing iodine solution. Allow it to stand for 20 minutes.

b (i) Record your observation at the beginning and end of the experiment. Record your results in the table below (4 mrks)

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

(ii) Suggest the nature of visking tubing. (1 mrk)
(iii) Account for the results obtained in a (i) above. (4 mrks) c) Which physiological process was being investigated in this experiment? (1 mrk) 2. You are provided with specimens labelled:
J: *Hibiscus rosaninensis*
K: *Bougainvillea glabra*
L: *Jacaranda mimosifolia*
M: *Zea mays*
N: *Lantana camara*

a) Using the characteristics given below and in the order in which they occur, construct a dichotomous key to identify the specimens. (8mks)

Characteristics

1. Type of leaf 2. Leaf venation
3. Leaf margin 4. Texture of leaf lamina b i) Identify the likely habitat of the

plant from which specimen labelled N was obtained from.(1 mrk) ii) Give a reason for your answer in bi) above. (1 mrk) c i) Name the class of the plant from which specimen M belong. (1 mrk) ii) Give a reason for your answer in c i) above. (1 mrk)

3. Below are photographs labelled J and K of organs obtained from different animals. Examine them and answer the following questions.

(a) Identify the organs labelled: X,Y (2 mrks) (b i) State the function performed by the above named organs. (2 mrks)

Organ X: Organ Y: ii) State **three** adaptations of organ labelled Y to its function. (3mrks)

c i) Identify the parts labelled **1, 2** and **3** in photograph K. (3 mrks)

ii) Using observable features, state how the parts labelled **1** and **3** you identified in (i) above are adapted to their functions.

(2 mrks)

KCSE PREDICTION 9 2019 PAPER 1

1. Write down two characteristics displayed by plants but are absent in animals. (2mks)
2. Define binomial nomenclature (1mk)
3. a) Explain the term cell specialization. (1mk)

b) state how the following cells are specialized to perform their function.

i). red blood cell (1mks)

ii. root hair cell (1mk)

4. Explain how an increase in temperature affects the rate of active transport (2mks)
5. Describe how turgor pressure builds up. (2mks)
6. A solution of sugarcane was boiled with hydrochloric acid, sodium hydrogen carbonate was added to the solution which was then heated with Benedicts solution. An orange precipitate was formed.

a) Why was the solution boiled with hydrochloric acid. (1mk)

b) To which class of carbohydrates does sugar in sugarcane belong. (1mk)

c.) state the form in which carbohydrates are stored in (2mks) i. Plants. ii. Animals.

7. Name **three** functions of saliva in the mouth (3mks)
8. Explain how the following plant adaptations minimize the rate of transpiration.

a) Sunken stomata. (1mks)

b) Leaf folding. (1mk)

9. Explain how the following forces contributes to the movement of water up the xylem vessels. (2mks) a) Cohesion.

b) Adhesion.

10. The table below shows the transportation of substances in the human body. (3mks)

substances	**Transported by the blood**	
	from	to
Oxygen	M	Whole body
N	Liver	Kidney
P	Intestines	Whole body

Give the identity of M,N and P.

11. How are lenticels adapted for gaseous exchange? (2mks) 12.

a) In what form is energy stored in muscles (1mk)

b) State one economic importance of anaerobic respiration. (1mks

13. State the importance of the following processes that take place in the nephrons of a human kidney

(a) Ultra filtration (1mk)

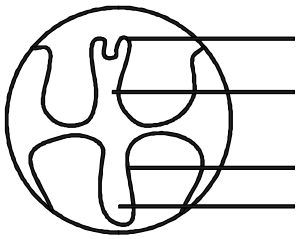
(b) Selective reabsorption (1mk)

14. Give 2 functions of each of the following structures in the human reproductive system.
(a) Epididymis. (2 marks)
(b) Oviduct (2 marks)
15. a) Explain why the carrying capacity for wild herbivorous animals is higher than that for cattle in a given piece of land. (2marks)
b) Name the bacteria found in root nodules of leguminous plants (1mark)
c) What is the role of the bacteria named in (b) above (1mark)
16. State **two** functions of luteinizing hormone in reproduction. (2mks) 17. Give the meaning of the following terms. (2mks) i) Protandry
ii) Self-sterility
18. In an experiment some germinating seeds were placed in large airtight flask and left for four days
(a) Suggest the expected changes in the composition of gases in the flask on the fifth day (1mk)
(b) Give a reason for your answer in (a) above (1mk)
(c) Name two factors that cause dormancy in seeds (2mk)
19. Give two adaptive features that make a predator efficient in capturing prey.
(2 marks) 20. The diagram below represents the internal structure of a bean seed.

plumule
x

hypocotyl

Y



a) Name the parts of the seed embryo represented by letter X and Y. (2 marks)
b) What type of germination would result if the hypocotyl elongates faster. (1 mark)
c) What is the significance of the part labelled Y emerging first during germination. (1 mark)
21. (a) Besides cephalothorax, name the other body part of the members of the class Arachnida. (1mk)
(b) Identify the respiratory surface in members of the class insecta. (1mk)
(c) Name the material that makes up the exoskeleton in members of the phylum arthropoda. (1mk)
22 State the two components of central nervous system.
(2mks)
23. Give a reason why the lumbar vertebrae have long and obroad transverse processes (1mk)
24. Name the strengthening material found in the following support tissues in plants. (2 mark)
Collenchyma –
Sclerenchyma –

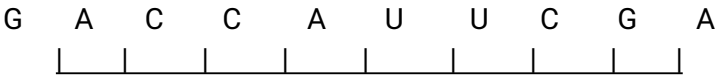
25. Study the diagram below and answer the questions that follow

(a) Name the bone represented in the diagram above (1 mark)

(b) Name the type of joint formed by the bone at its anterior end. (1 mark)

26. State the role of Eustachian tube (1mk)

27. (a) The diagram below represents a section or portion of a certain nucleic acid.



With a reason, identify the type of nucleic acid whose portion is shown above. (2mks)

Reason

28. (a) Name the response to contact with surface exhibited by tendrils and climbing stems in plants(1mk)

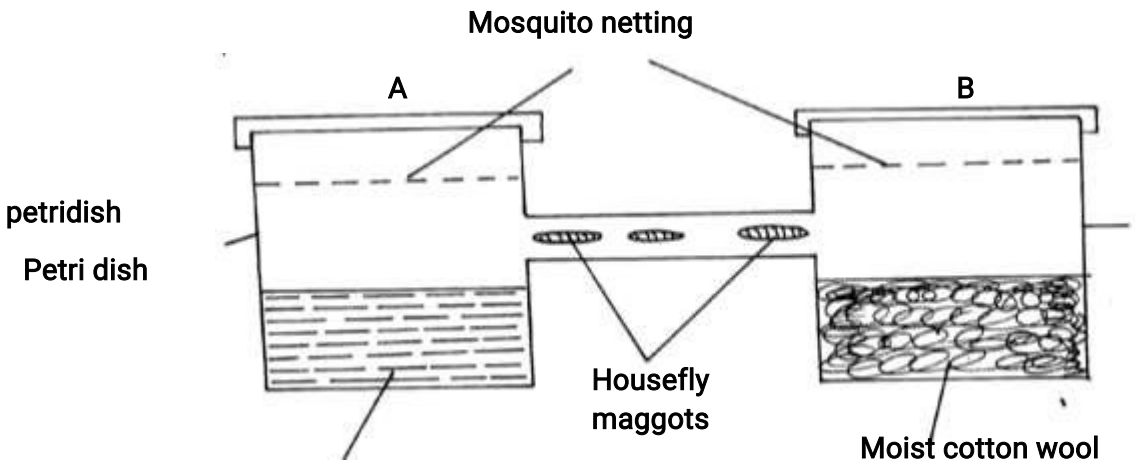
b). State **two** biological importance of tropisms to plants. (2mks) 29. State two processes that takes place during interphase (2 marks)

30. A person had a car accident that damaged one part of his brain but left the rest unaffected. Complete column B by filling the part of the brain whose damage would correspond to the symptoms shown in column A (3mks)

COLUMN A	COLUMN B
Inability to regulate body temperature	
Irregular heart beat and breathing movements	
Inability to maintain proper body balance and posture	

31. State two advantages of natural selection to organisms (2 marks)

32. The following experiment was set up in a chamber made from two connected petridishes. Housefly maggots were introduced at the center of the chamber so that the maggot could move to either petridish A or B as shown below.



Anhydrous Calcium chloride

(a) Name the type of response being investigated in the set up. (1mk)
(b) State the survival value of the response named in (a) above (1mk)
(c) Give the role of calcium chloride in the experiment above. (1mk

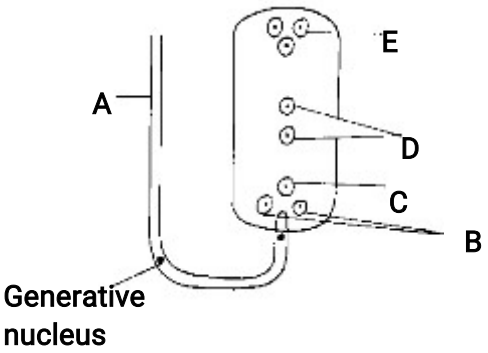
33. Distinguish between homologous and analogous structures. (1mk)
34. Identify parts of neuron that affects the speed of impulse transmission (2mks)

PAPER 2

SECTION A

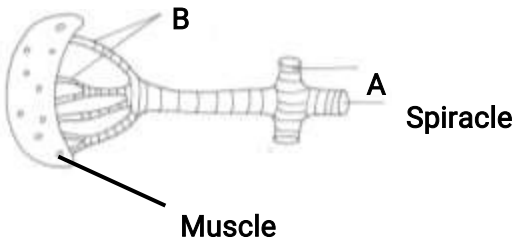
Answer all questions in section A

1. The figure below shows the embryo-sac before fertilization.



(a) Identify the structures labelled A and B . (2mrks)
(b) Identify the structures labeled in the diagram that will develop into the following after fertilization.
i) Embryo (1mrk) ii) Endosperm (1mrk) (c) State the chromosomal constitution of each of the following nuclei after fertilization.
i) C (1mrk) ii) D (1mrk)
(d) Briefly outline the process of "double" fertilization in flowering plants. (2mrks)

2. The diagram below shows part of gaseous exchange system in an insect. Study it and answer the questions that follow.



a) What are the structural adaptations of the parts labelled A and B to their functions?

(2mks) i) **A**: ii) **B:**

b) Name the parts of the following animals that carry out the same function as part **B** above. (2mks) i) Man

ii) Tilapia fish

c) Name the structures used for gaseous exchange in plants growing in waterlogged soils. (1mk)

d) i) Give **two** reasons why accumulation of lactic acid during vigorous exercise leads to an increase in heartbeat.

ii) In what form is oxygen transported from lungs to the tissues? (1mk 3.

a) State any two (2) classes of the sub division Gymnospermaphyta. (2marks)

b) Give one structural difference between a monocotyledonous and a dicotyledonous leaf. (1 mark)

Monocotyledonous leaf	dicotyledonous leaf.

c) While walking through the school playground, a student came across an organism with the following descriptions:-

- A pair of antennae
- Two pairs of wings
- Segmented abdomen
- Three pair of legs

i) Give the phylum and the class that the organisms belong. (2 marks) Phylum:
Class:

ii) Name the three body parts in the organism. (3 marks)

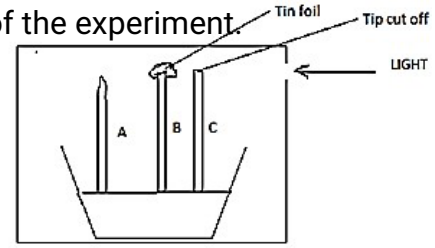
4. In an experiment, a variety of garden peas having a smooth seed coat was crossed with a variety with a wrinkled seed coat. All the seeds obtained in the F1 had a smooth seed coat. The F1 generation was selfed. The total number of F2 generation was 7324.

(a) Using letter R to represent smooth seed coat, work out the genotype of the F1 generation. (4 marks)

(b) From the information above, **work out** the following for the F2 generation

i) Genotypic ratio (2 marks) ii) Phenotypic ratio (1 mark) iii) Number of Wrinkled seeds (1 mark)

5. The diagram below represents growing seedlings, which were subjected to unilateral light at the beginning of the experiment.



a) What was the aim of the experiment? 1mk)

b) Why were the seedlings labeled B and C included in this experiment. (1mk)

c) (i) State the results of A after five days. (1mks) ii) Account for the results in c(i) above 3mks) d) State what would be observed after five days if the tin foil was removed. (1mk)

e) State the biological phenomenon shown by the seedlings grown in the dark (1mk)

SECTION B (40 marks)

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

6. $1cm^3$ of catalase solution was added to equal volumes of hydrogen peroxide solutions at different pH values. The time taken to collect $10cm^3$ of oxygen was measured .The results were as follows.

pH of solution	Time taken to collect gas(cm3)
5.5	30
6.0	20
6.5	12
7.0	8
7.5	5
8.0	9
8.5	15
9.0	25

a) Plot a graph of time against pH of solution 6mk

b) Account for the rate of reaction at:

i) pH. 7.5 (2mk)

ii) pH 5.5 (2nks)

iii) pH 9.0 (2mks)

c) Write a word equation for the reaction above. 1mk

d) What is the importance of the reaction you have given in c above 2mks

e.) Name an organ in the human body where the above reaction takes place. (1mk)

f) Other than the factor being investigated above name four other factors that affect the rate of enzyme controlled reaction. (4mk 7. a) Define pollution. (2 marks) b) Describe water pollution under the following.

i) Causes. (6 marks) ii) Effects of pollutants on plants and animals. (6 marks) iii) Methods of controlling pollution (6 marks)

8. a) Define the following terms

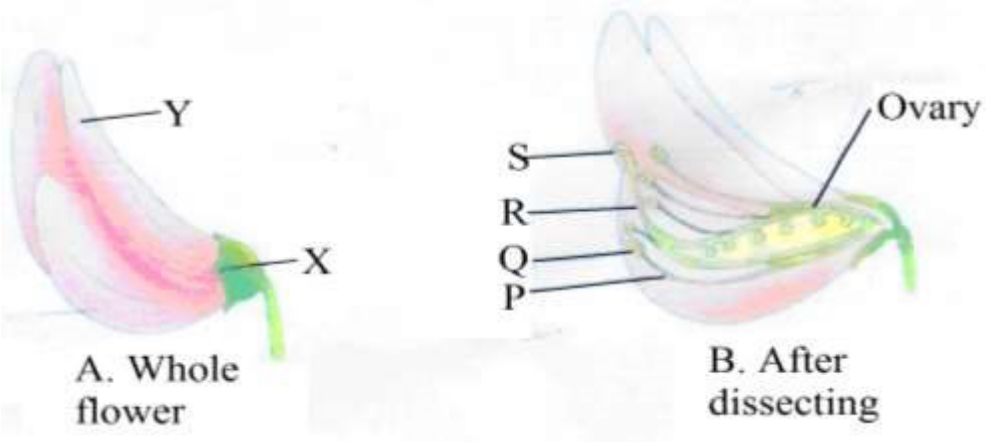
i.) cell (1mk) ii.) Tissue (1mk) iii) Organ. (1mk iv) Organelle (1mk)

v.) Name one specialized tissue in animals; (1mk)

b. Describe how various cell organelles are adapted to their functions. (15 marks)

PAPER 3

1. (A) During a field study, a student took a photograph of a flower before and after removing some petals as shown below.



(a) Name the parts marked Q,R,S and X (4mks)

(b) State the functions of parts X and R (2mks)

(c) Briefly describe the nature of the corolla of the flower above (2mks)

(d) Which term best describe the nature of the calyx of the flower above (1mks)

(e) What type of ovary does the flower have? (1mks)

(f) (i) With reference to part labeled Q state the class of the plant from which the student took the flower class (1mks)

(ii)Give a reason to support your answer in f(i) above (1mks)

(g) Giving reasons state the agent of pollination in this flower

(i) Agent (1mks)

(ii) Reasons (1mks)

(B) a) The diagram below represents a longitudinal section of a fruit.

(i) State the type of fruit (1mk)

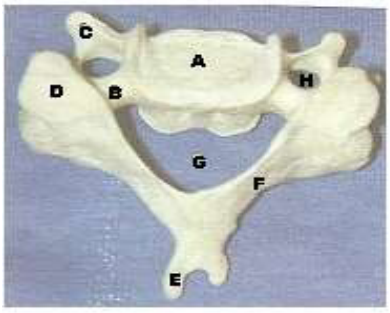
(ii) Give a reason for your answer in (i) above (1mk)

(iii)State the type of placentation in the fruit and give a reason for your answer . (2mks) Placentation Reason

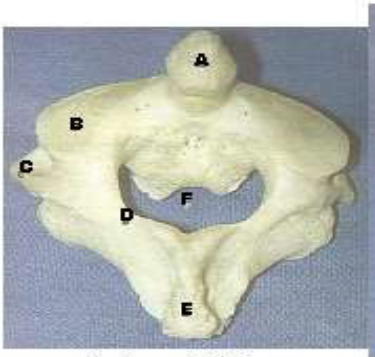
iv) How is the fruit adapted for dispersal? (2mks)

2. The photographs below are bones from the same mammal. Examine the bones and answer the

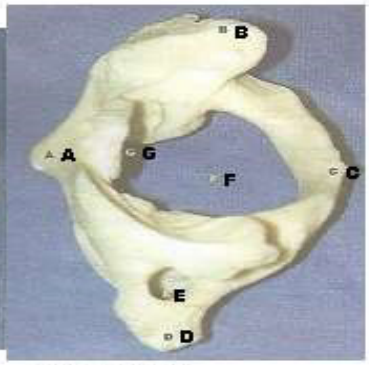
questions that follow.



Photograph 3.03



Photograph 3.02



Photograph 3.01

(a) Name the body region from which the bones were obtained. (1mk)

(b) Name the bones in terms of 3.01, 3.02 and 3.03 in the correct order from anterior to posterior. (1mk) (c) Name and the part labeled as

(i) **F** in photograph 3.02 (1mks)

(ii) **H** in photograph 3.03 (1mks)

(iii) **A** in photograph 3.02 (1mks)

(d) Identify the bones in photograph (2mks)

3.01 -

3.02 -

e) What is the function of part H in photograph 3.03 (1mk)

f) Name the bones that articulate with bone in photograph 3.03 in the distal and (2mks) end

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

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

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

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

(b) Place 10ml of fresh bicarbonate indicator in a boiling tube. Using the drinking straw, bubble air through the bicarbonate indicator until there is colour change.

(i) Record your observation. (1 mark)

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

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

(i) Record your observation. (1 mark)

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

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

(ii) Write down a word equation for the process named in d (i) above. (1 mark)

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

mark) **KCSE PREDICTION 10 2019**

PAPER 1

1. Name two cells which line the trachea, bronchus and bronchioles of a mammal and play a role during gaseous exchange. (2 mark)
2. a) The bryophytes are normally small plants with a maximum height of 2 - 3 cm. Suggest why they never grow bigger. (2 marks)

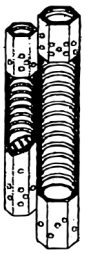
b) In terms of alternation of generation, how does the moss plant differ from the ferns. (1 mark)

3. In mammals haemoglobin is confined to red blood cells. Give two advantages of this. (2 marks)
4. A man was involved in an accident and got a head injury. When he reached the hospital, he was not able to breath properly.

a) Which part of the brain has been damaged. (1 marks)

b) State two other functions of the part of brain named in (a) above. (2 marks)

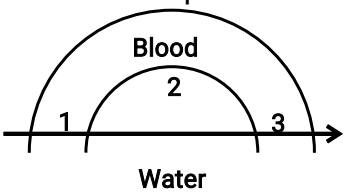
5. The cells shown below are adapted for transport in flowering plants.



a) Name the tissue in which these cells are found. (1 mark)

b) Identify and explain two observable features of these cells that adapt them to their function in transport. (2 marks)

6. The figure below shows parallel flow across a gill plate of a bony fish.



a) At which point is the

i) highest diffusion of oxygen. (1 mark)

ii) Most oxygenated blood. (1 mark)

b) State the reason why counter current flow in a bony fish achieves the highest concentration of gases exchanged. (1 mark

7. Name the part of the eye that secretes the aqueous humour. (1 mark)

b) State two functions of aqueous humour. (2 marks)

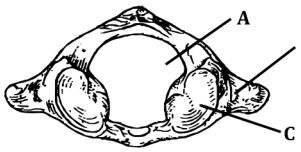
c) Give one difference between the fovea and the blind spot. (1 mark)

8. a) Name the cells that are protected by the root cap against mechanical damage by soil particles.(1

b) State two characteristics of the cells mentioned in (a) above. (2 marks)

9. The diagram below shows a mammalian bone.

B



a) With a reason, identify the bone. (2 marks)

Identify .....

Reason .....

b) Identify each of the parts labelled A and B. (2 marks)

c) State the function of the part labelled C. (1 mark)

10. From potato whose cell sap was 30% sugar were obtained two potato cylinders labelled A and B. A was placed in a solution or 10% sugar concentration while B was placed in 50% sugar concentration.

a) What change was expected in cylinder B. (1 mark)

b) Account for the change expected in potato cylinder A. (3 marks)

11. a) State two internal conditions necessary for germination of a seed. (2 marks)

b) State one way in which viability of seeds is lost. (1 mark)

12. Give the structure of the cell that perform the following functions

a) Synthesis of ribosome. (1 mark)

b) Regulate exchange of substances in and out of the nucleus. (1 mark)

13. State the functions of the following hormones in human male reproductive system.

a) Follicle stimulating hormone. (1 mark)

b) Luteinising hormone. (1 mark)

14. a) The diagram below represents a set-up that students used in an investigation.

Air

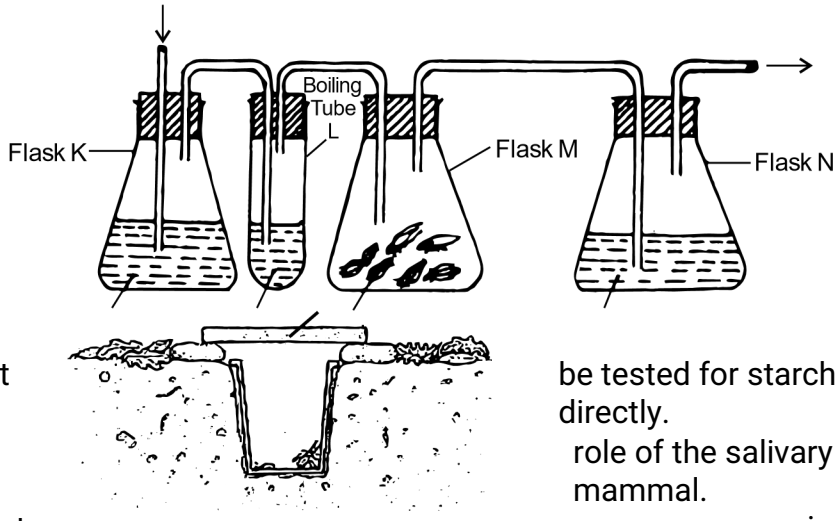
Potassium hyroxide Lime water Cockroaches Lime Water

a) Name the physiological process that was being investigated. (1 mark)

b) i) What observation would be made in boiling tube L. (1 mark)

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

15. a) The diagram below represents the apparatus used by a biologist.Q



a) Identify the apparatus. (1 mark)

b) What is the role of the part labelled Q. (1 mark)

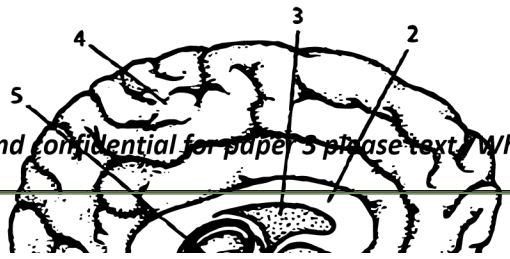
16. Explain each of the following

(a) variegated plants accumulate less food than non-variegated plants under similar conditions. (2 marks)

(b) A leaf cannot be tested for starch by adding iodine solution directly. (2 marks)

17. Explain the role of the salivary gland in the digestion of food in a mammal. (3 marks)

18. A student came across a piece of food substance and he suspected that it contains lipids. He took it to Biology laboratory and asked the



teacher to provide him with an apparatus to investigate whether the food substance contained lipid. The teacher provided him with a filter paper and source of heat. Describe an experiment that he would do using the apparatus to confirm the presence of lipids in the food substance. (4 marks)

19. State the biological significance of each of the following in the digestive system.

i) Emulsification of lipids. (1 mark)

ii) Presence of calcium in herbivores. (1 mark)

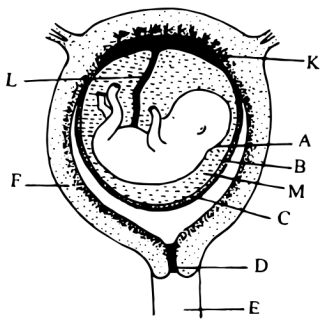
iii) Thin epithelium of the ileum. (1 mark)

20. The di agram below shows part of the human brain.

Which of the numbers represent structures responsible for

i) control of the heart rate. (1 mark) ii) regulation of the blood pressure. (1 mark)

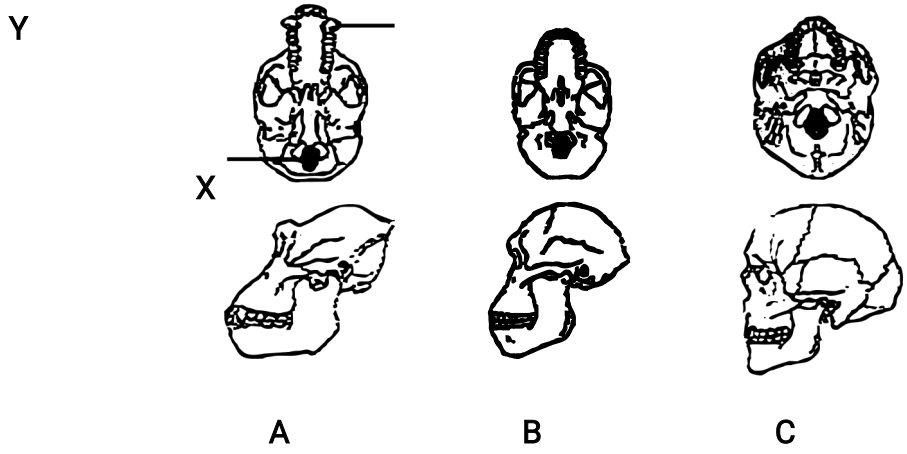
21. The diagram below illustrates the relationship between developing foetus and the maternal tissues.



a) Name the part labelled C. (1 mark)

b) State the function of the part labelled L. (2 marks)

22. The diagram below represents the fossilised skulls of three different species of primates. They were either bipedal or quadrapedal.

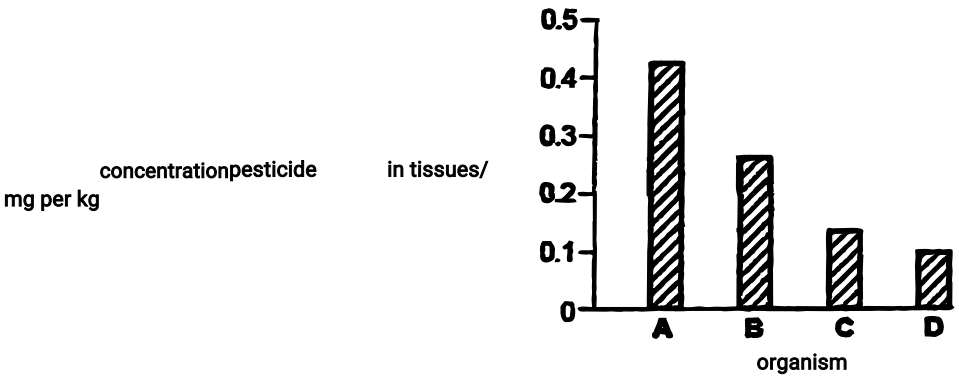


a) What do you understand by the term quadrapedal animal? (1 mark)
b) Which of the skull (A, B or C) belong to a quadrapedal primate? (1 mark)
c) Explain how the change in the skull from B to C could indicate a change in intelligence. (1 mark)

23. Distinguish between dioecious and monoecious plants. (1 mark)
b) What are disadvantages of self-pollination in plants. (3 marks)

24. a) What is the importance of a test cross? (1 mark)
b) What would be expected results from a test cross. (2 marks)

25. This is a food chain extracted from a certain ecosystem.
Mango tree □ caterpillars □ sparrow □□hawk.
a) Draw a pyramid of numbers for this feeding relationship. (1 mark)
b) The concentration of pesticides in the tissues of the organism in the food chain was measured and the results plotted as shown in the bar graph below.

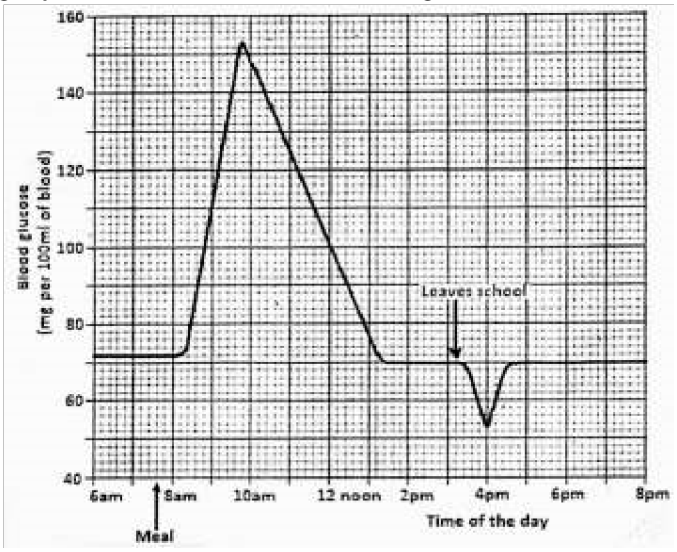


i) Which organism in the bar chart is sparrow? (1 mark)
ii) Give reason for your answer. (2 marks)

26. Name the material (s) that strengthen the following supporting tissues in woody plants
i) Collenchyma (2 marks)
ii) Sclerenchyma (1 mark)

PAPER 2

1. The graph below shows the blood glucose concentration of a boy over 14 hours.



a) The boy had a meal at about 7:45 am

i) What was the boys blood glucose concentration before this meal. (1 mark)

ii) What was the boy's maximum blood glucose concentration after this meal. (1 mark)

b) After the meal the boy's pancreas secreted a hormone that helped to remove excess glucose from the blood and store it.

i) On the graph mark with letter G when the pancreas started to secrete the hormone. (1 mark) ii) State the form in which glucose is stored in the body. ..... (1 mark) iii) State one organ in the body where this storage occurs ..... (1 mark) c) On the way home from school the boy was involved in a fight.

i) State what happened to the boys glucose concentration at the start of the fight. (1 mark) ii) During the fight the boy's body produced another hormone which prepared him for the fight.

Name the hormone. ..... (1 mark) iii) State one effect this hormone had on the boy's body. (1 mark)

2. a) What is Taxis response. ..... (1 mark)

b) Give an example of:

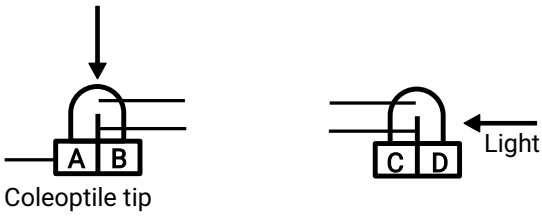
i) Aerotaxis (1 mark) ii) Rheotaxis (1 mark)

c) An oat seedling has a protective sheath (the coleoptile) which is frequently used as convenient plant material for experiments on phototropism.

An experiment was carried out in which the tips of oat coleoptiles were removed and placed on blocks of agar. The agar blocks underneath each coleoptile were divided by thin sheets of metal. The tips of the coleoptiles were either illuminated evenly from above or from the right during this initial treatment period.

The experiment set-up is shown in the diagram below.

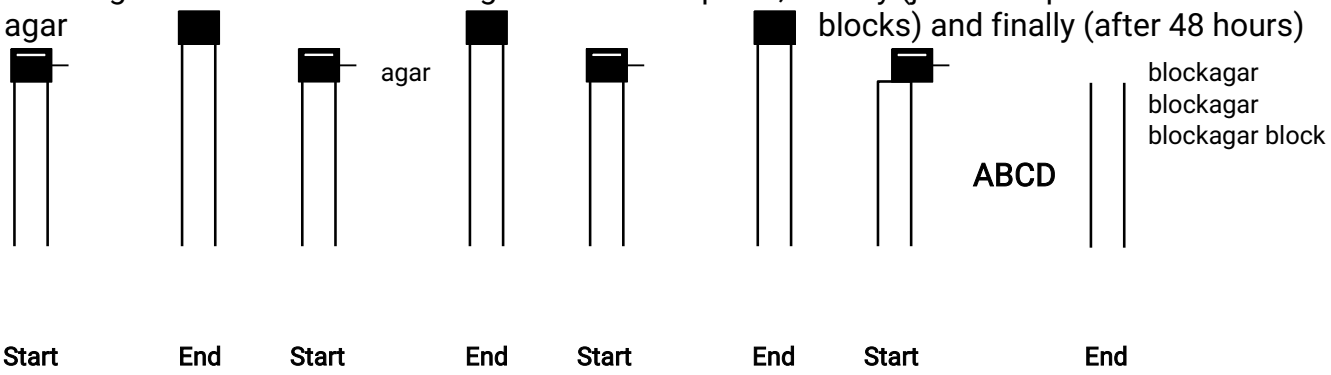
Light



Thin sheet of

Block of agarmetal

After the treatment outline above the agar blocks then were paced on decapitated coleoptiles. The diagram below shows the height of the coleoptiles, initially (just after placement of the agar blocks) and finally (after 48 hours)



i) Complete the diagram above by drawing a result for the ajar block D. (1 mark)

ii) Account for your answer in c(i) above. (3 marks)

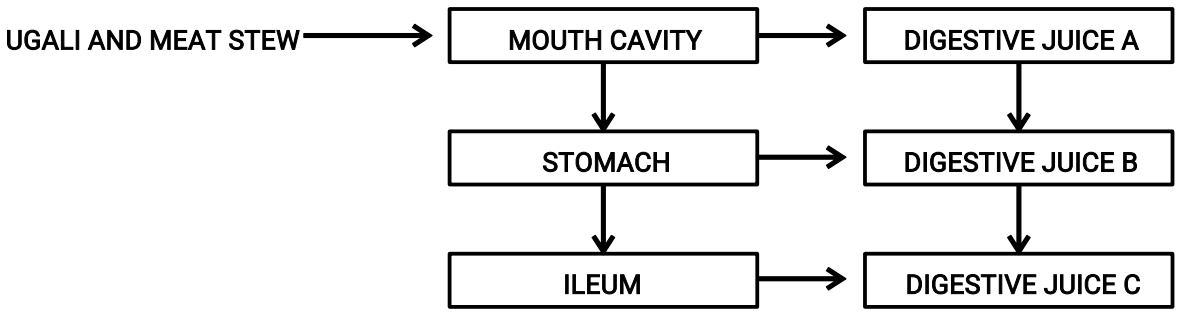
iii) Explain the reason for the inclusion of blocks A and B in the experiment (1 mark)

3. In 4 O'clock plant, a white flowered plant was crossed with a red flowered plant. When the F1 plants were crossed 204 white, 418 pink and 196 red were obtained .

a) i)What is the phenotype (s) of the F1 plants. (1 mark) ii)Using letter R to represent the gene for red colour and letter W to represented the gene for white colour, work out the genotypes of F2 plants. (4 marks)

i) Name the disorder in humans that is due to non-disfunction. ..... (1 mark) ii) Give the scientific name of the garden pea plant. ..... (1 mark)

4. The diagram below represents passage of a meal through the human digestive system. Study it and answer the questions that follow.



a) Name the physical process that will occur in mouth cavity. (1 mark)

b) Name the digestive juices B and C (2 marks)

c) Explain two ways in which the digestive system is protected from corrosive effects of digestive juice.

(2 marks)

d) Name the hormone that stimulates secretion of juice B. (1 mark)

e) Identify the contents of digestive juice A. (2 marks)

5. The table gives information about the distributions of lichens in and around a city. Atmospheric sulphur (IV) oxide (SO_2) levels and the pH of rainwater were also recorded.

Distance from city centre (km)	Number of lichen species per km²	Atmospheric SO2 concentration (Ng/m³)	pH of rainwater
0 - 1.5	0	240	4.6
1.6 - 3.0	1	220	4.8
3.1 - 4.5	7	185	5.0
4.6 - 6.0	13	120	5.5

a) Describe the relationship between each of the following:

i) Distance from the city centre and the number of lichen species per km² (2 mark

ii) Distance from the city centre and atmospheric sulphur (IV) oxide concentration. (2 marks) iii) Atmospheric sulphur (IV) oxide concentration and rain water pH. (2 marks)

b) Calculate the average decrease in atmospheric sulphur (IV) oxide concentration per kilometre over the
6km from the city centre. (2 marks)

SECTION B (40 marks)

Answer question 6 (compulsory) and either question 7 or 8 in the space provided at the end.

6. The data shows the effect of age on basal metabolic rate (BMR) in males and females.

Age (years)	Basal Metabolic Rates ($kjm^{-2}\,hr^{-1}$)	
	Males	Females
Birth (0)	225.0	225.0
10	237.5	237.0
20	212.5	200.0
30	200.0	187.5
40	175.0	162.5
50	162.5	150.0
60	155.0	145.0
70	150.0	140.0
80	145.0	135.0

a) Plot a graph of basal metabolic rate against age (years). (8 marks)

b) Under what conditions should BMR be measured. (1 mark)

c) Suggest an explanation for each of the following:

i) The high BMR between the ages of D and 5 years. (1 mark)

ii) The difference in BMR between males and females above the age of 5 years. (2 marks) iii) The change in BMR after the age of 45 years. (2 marks)

d) Aerobic respiration is known to be a more efficient type of respiration with minimal negative effects.

Give reasons for this observation. (3 marks)

e) i)State the product (s) of the first phase of Aerobic respiration. (1 mark)

ii) State the sites for the following processes. (2 marks) Glycolysis

Kreb's cycle

Answer any ONE of the Questions 7 or 8.

7. Describe how the cervical, lumber and thoracic vertebrae are suited to their functions. (20 marks)

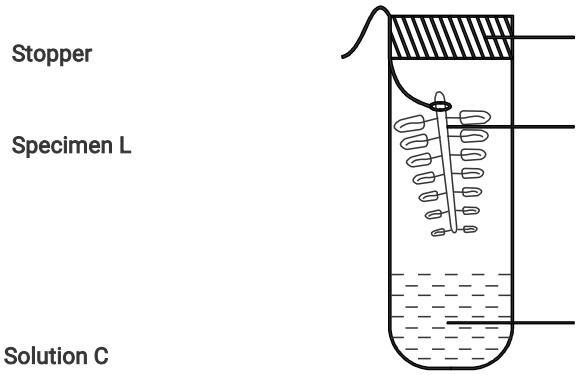
8. Describe the mechanism of transport of carbon (IV) oxide in mammalian blood. (20 marks)

PAPER 3

1. a. You are provided with specimen L, Solution C and a drinking straw.
   i. State the habitat of specimen L (1 mark) ii. Name the trophic level occupied by specimen L. (1 mark)

b. i. Place 5cm ^{3} of solution C into a boiling tube. Using a drinking straw, blow gently in to the solution and record your observations. (2 marks)
   ii. Explain the observations in b (i) above. (1mark)

c. Place 5cm3 of solution C into each of the two remaining boiling tubes. Suspend specimen L into one of the boiling tubes as shown below.



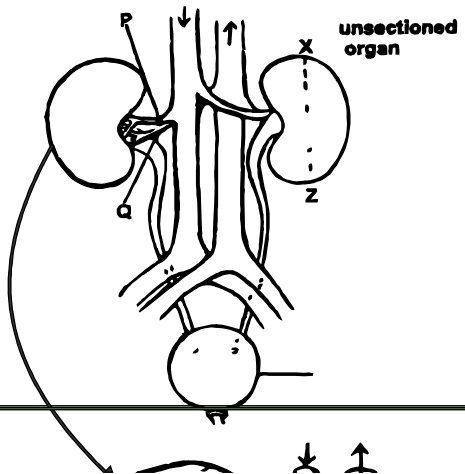
Wrap the boiling tubes with aluminium foil and leave the set up for at least 40 minutes. Remove the aluminium foil and observe after 40 minutes.
   i. Record your observations. (2 marks) ii. Account for the observations in c(i) above. (3 marks)

2. You are provided with the following specimens P and Q. Study and observe them keenly and use them to answer the questions that follow.

a. What types of fruits are specimens P, Q (2 marks)

b. Make a transverse section through specimen P. Draw the transverse section of the specimen and label any three parts. (4 marks)

c. Squeeze the juice from Specimen P in a small beaker. Using the reagents provided i.e. X - (Benedicts Solution) and Y (DCPIP), test the food substances, procedures, observations and



conclusions in the table below. (8 marks)

d. Name the type of placentation in Specimen Q. (1 mark)

e. i. With a reason, name the class to which Specimen Q belongs. (2 marks)

ii. State the method of seed dispersal in specimen Q. (1 mark)

3. The diagram below shows a pair of mammalian organs with their blood supply. One of the organs has been sectioned longitudinally. Examine them keenly.

a. Identify the pair of organs. (1 mark)

b. State the two main functions of the organs. (2 marks)

c. Name the blood vessel labeled ; M,N (2 marks)

d. Which part of the nephron is found in region S, T (2 marks)

e. State the function of the structure labeled R, W (2 marks)

f. If the actual longitudinal length (X - Z) of the unsectioned organ is 9 Cm, calculate the magnification of the drawing.
(2 marks)

g. Give a reason why blood vessel P carries a higher concentration of urea than vessel Q. (1 mark)

KCSE PREDICTION 11 2019 PAPER 1

1. Name the blood vessel that supplies:

(a) The heart with nutrients. (1mk)
(b) The foetus with oxygen (1mk)

2. Explain why it is important to stain specimen to be observed under a light microscope. (2mks)
3. What is wilting? (2mks)
4. State the significance of the following steps while testing for disaccharide in food sample. (2mks) (a) Addition of dilute hydrochloric acid (b) Addition of sodium bicarbonate.
5. a) i) Name the fluid produced by sebaceous gland. (1mk) ii) State **two** function of the fluid name in 5 a) (i) above. (2mks)
   b) Explain how malpighian layer of the skin is adapted to perform its function. (1mk)
6. A certain animal had one cell from its alimentary canal observed under light microscope. A total of 40 chromosomes were seen.

(a) State the number of chromosomes in
(i) The spermatozoan of this animal (1 mk)
(ii) One of cells in the tongue. (1mk)
(b) Name a structure in mature plant where meiosis takes place. (1mk)

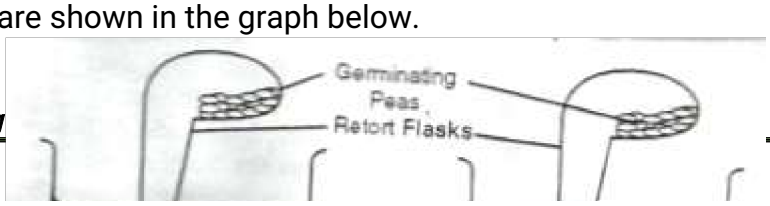
7. A biological washing detergent contain enzymes which remove stain like mucus and oil from clothes which are soaked in water with the detergent.

(a) Explain why stain would be removed faster with detergent in water at $35^{o}C$ rather than $50^{o}C$ (1mk)
(b) Why is boiling clothes with the detergent less likely to remove stain. (1mk)
(c) Name an enzyme that catalyses the decomposition of sodium hydrogen carbonate to facilitate transportation of carbon (IV) Oxide. (1mk)

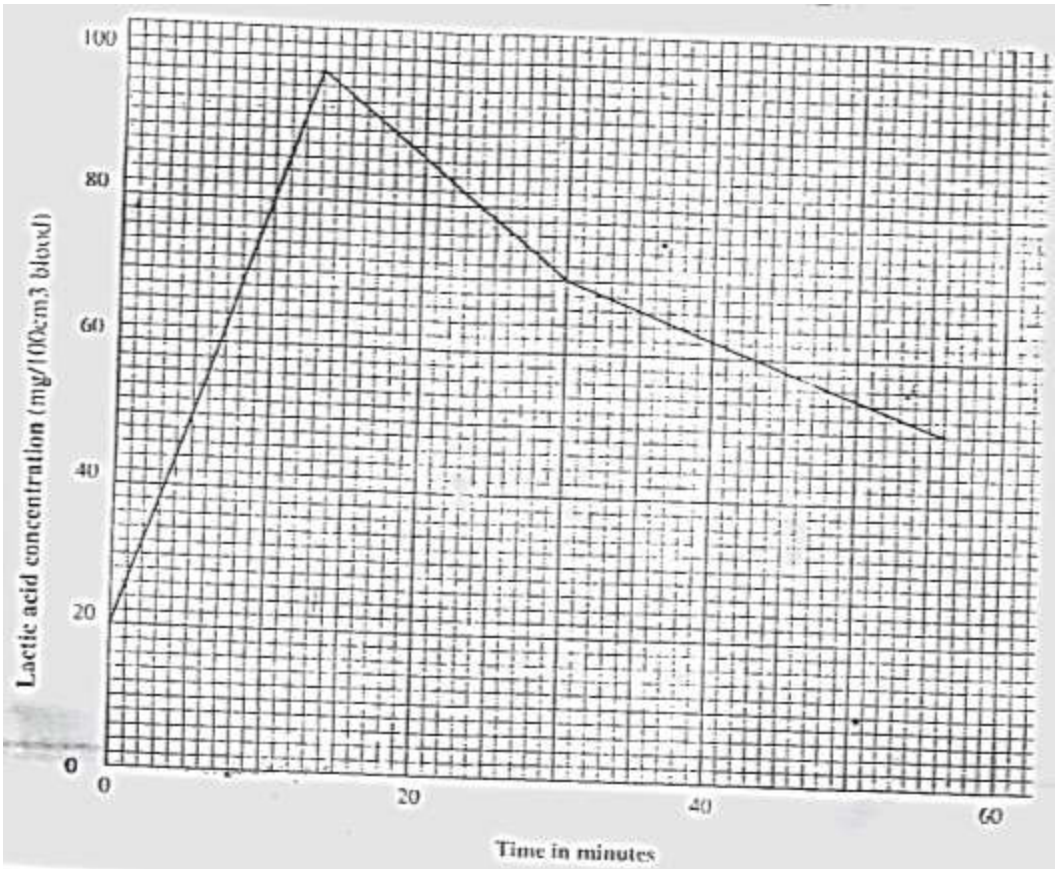
8. Form 2 students from samba secondary school set up an experiment as shown below.

(a) Explain the change observed at the end of the experiment.
(2mks) a) Explain what would happen if water has been used instead of potassium hydroxide. (2mks)

9. State **two** advantages of metamorphosis to the life cycle of insects. (2mks)
10. The concentration of lactic acid in blood during and after an exercise was determined. The results are shown in the graph below.



For marking



(a) (i) By how much did the lactic acid increase at the end of 10 minutes? (1mk)

(ii) After how many minutes was the lactic acid concentration 78mg/100cm^3 (2mks)

(iii) What would be the concentration of lactic acid at the 60th minutes. (1mk)

Give a reason for the high rate of production of lactic acid during the exercise. (1mk)

11. Name the part of human brain that perform the following function (2mks) (a) Controls peristalsis

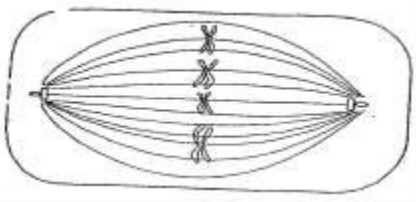
(b) Control intelligence

12. Outline the differences between Darwin's theory and Lamarck's theory of evolution. (2mks)

13. Give **three** functions of cystokinin hormone in plant . (3mks)

14. Explain why plants do not require specialized excretory organ. (3mks)

15. The diagram below represents a stage in cell division.\



(a) Identify the stage of cell division (1mk) (b) Give a reason for your answer (1mk)

16. Outline **three** functions of colon . (3mks)
17. State **two** advantages of closed circulatory systems in mammal. (2mks)
18. Explain what happens to excess amino- acids in the liver of humans (3 mks)
19. (a) Which portions of the human nephron are only found in the cortex? (3 mks)

(b) (i) What would happen if a person produced less antidiuretic hormone? (2 marks)

(ii) What term is given to the condition described in (b) (i) above (1 mark)

20. Explain double fertilization as used in flowering plants. (2mks)
21. State one survival value for each of the following in plants (*1mark)*

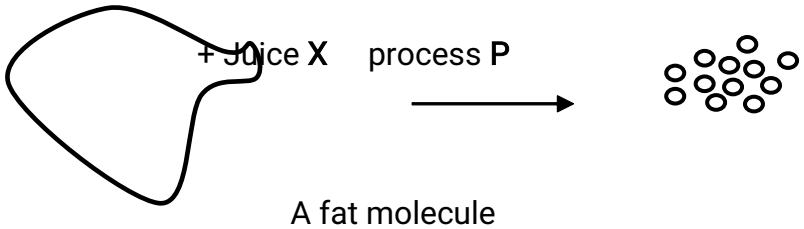
a) Haptotropism in stems (*1mark)*
b) Thigmonasty in *Mimosa pudica*
c) What is meant by the term polyploidy? (*1mark)*
d) Give an example of a genetic disorder caused by non-disjunction in somatic cell *(1mark)*

22. (a) Explain how mammalian trachea is adapted to its function (2mks)
(b) Name the gaseous exchange site in bony fish. (1mk)
23. Explain the role of the following hormone in homeostasis
(a) Insulin (3mks)
(b) Aldosterone hormone when there is less water in blood stream. (2mks)
24. Outline **three** difference between plant divisions Bryophyta and Pteridophyta (3mks) 25. Name **two** products of light stage of photosynthesis that are useful in light independent stage. (2mks)
26. State **two** functions of xylem tissue. (2mks)
27. State **two** function of golgi apparatus (2mks)

PAPER 2

SECTION A

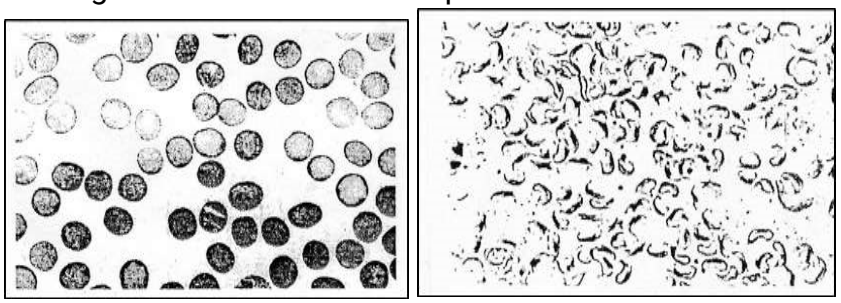
1. The following is an illustration of a certain process that occurs in mammals



A fat molecule

(a) Name process **P** (1mark)
(b) Name the juice involved in the process **P** (1 mark)
(c) List two Salts found in the juice name in (b) above that aids in process **P** (2 marks)
(d) Give a reason why liver damage leads to impaired digestion of fats (1 mark)
(e) What would be the likely effect on digestion if the small intestine of a human is reduced in an operation? (2 marks)
(f) State the fate of excess glucose in the human body. (1 mark)

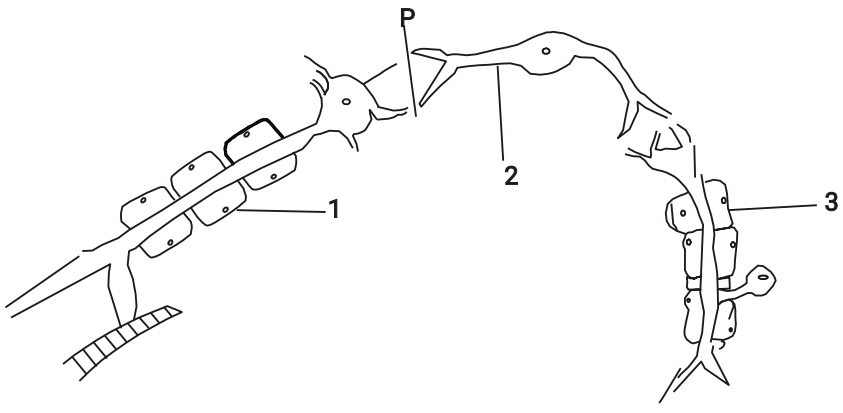
2. The diagrams below shows samples of blood obtained from two different persons **A** and **B.**



Blood sample from person **A** Blood sample from person **B**

a) What genetic disorder is person **B** suffering from? (1 mark)
b) State one advantage and one disadvantage of the disorder in (a) above when its in heterozygous state.
(2 marks)
c) Work out the genotypes and phenotypes of the resulting offsprings of marriage between person **A** and person **B** (5 marks)

3. The diagram below shows three different types of neurons along a reflex arc



(a) What is a reflex arc? (1mark)

(b) Identify the neurons labeled **1** and **2** (2 marks)

(c) Using arrows show, the direction of impulse transmission on the diagram. (1 mark)

(d) Name the part of the spinal cord where the cell bodies of neurone **1** and **2** are located (1 mark)

(e) Describe the transmission of impulse across the part labeled **P** (3 marks)

4. During an ecological study of a grassland ecosystem, a group of students recorded the following observations.

i. Grasshoppers feed on grass ii. Guinea fowls feed on grasshoppers, termites iii. Vultures feed on guinea fowls and leopards iv. Leopards feed on gazelles v. Termites feed on grass vi. Gazelles feed on grass

(a) From this record of observations construct a food web. (4 marks)

(b) Write down, the food chains in which the guinea fowls are secondary consumers. (2 marks)

(c) Name the organisms through which energy from the sun enters the food web. (1 mark)

(d) Name the organism that has the least biomass in the food web. (1mark)

5. Below is a chemical equation, study it and answer the questions that follow:-

Carbon (IV) oxide + water $\xrightarrow[B]{A}$ Oxygen + glucose

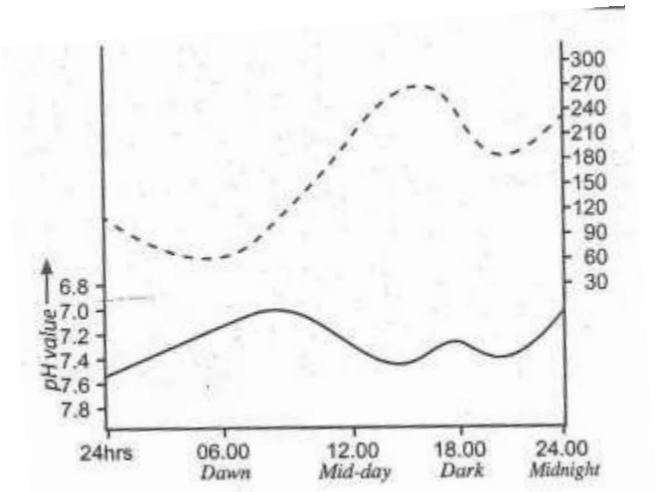
(a) Name process A and B (2 marks)

(b) What is the biological significance of process **A** (1 mark)

(c) In which organelle does process **A** and **B** take place? (2 marks)

(d) Name two stages of process **B** (2 marks)

(e) Define compensation point (1mark)



SECTION B (40 MARKS)
Answer Question 6 (Compulsory) And Either Question 7 Or 8 In The Spaces Provided After Question 8

6. The graph below shows changes in pH and oxygen saturation in river water over a 24 hour period

% Oxygen saturation

Key

_____ pH value

…… % saturation of oxygen dissolved

a) when is the pH value and dissolved oxygen saturation % highest? (2 marks)
b) Account for the pH value recorded
i) Between 08.00 and 1.00 p.m (2 marks)
ii) Between 2100 and 2400 midnight (2 marks)
c) Explain the influence of light intensity on % saturation of oxygen dissolved in this study (4 marks)
d) State two structural adaptations that the submerged plants in this river have, which enable them to carry out photosynthesis (2 marks)
e) Explain the variations that will be recorded if a similar study was carried out in a river near a nitrate fertilizer industry. (4 marks)
7. Explain the various ways in which a typical cell is adapted to its functions (20 marks)
8. Discuss the causes, effects and control measures for water pollution (20 marks)

PAPER 3

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1. **You are provided with:**

- Solution **A**
- Benedict's solution labeled **solution B**
- Solution **C**
- 0.1 % NaCl solution
- 1.4 % NaCl solution
- Iodine solution labeled solution **E**

Label three test tubes P, Q and R. Into each test-tube, place 3m1 of the solution C (a) Put a drop of solution C from the test tube P on a white tile and add a drop of solution E.

Repeat the procedure for each test tube Q and R.

Record your observations in the table below. (3mks)

Test- tube	Observation
P	
Q	
R	

b) To test tube Q add 3 drops of 0.1% sodium chloride solution and 2m1 of solution A. To test tube R, add three drops of 1.4% sodium chloride solution and 2m1 of solution A. Place the test tubes P. Q and R in a water bath and maintain at 37°C for 30 minutes. Using a drop of the

solution from each test tube ,(**A CLEANDROPPER MUST BE USED IN EACH TEST TUBE**) repeat the procedure in (a) above and spare the rest for the next question. Record your observations in the table below. (3mks)

Test- tube	Observation at end of experiment
P	
Q	
R	

c) Put 2cm^3 of solution from test tubes P in a clean test tube and add 2cm^3 of solution B, shake then heat the mixture to boil . Record your final observations in the table below.

Repeat the procedure for solution Q and R. (3mks)

Test- tube	Find observation after the experiment
P	
Q	
R	

d) Why was the test tube P included in the experiment? (lmk)
e) Account for observations made in test tube Q and R at the end of the experiment. (4mks) i) Test tube Q ii) Test tube R.
f) Suggest the identity of solution A. (I mk)
g) Why was the water bath maintained at 37°C? (I mk)

2. Use the photographs A, B,C and D to answer the following questions

A

B

C D

a) Name the condition exhibited in A which hinder self-fertilization. (1 mk)

b) Explain how the above condition hinders self-fertilization. (1 mk)
c) With reasons give the tern given to gynoecium B and C
B (1 mk)
Reason (1 mk)
C (1 mk)
Reason (1 mk)
d) i) State the division where plant in photograph D belong and give reason for your answer.
Division (1 mk)
Reason (1 mk)
ii) State the type of nutrition exhibited by specimen D. (1 mk)
iii) Give the function of the structure labeled Y. (1 mk)
iv) Using letter T, indicate **on photograph D** where the female sex organ is found. (1 mk)

3. You are provided with specimen **W** Examine it using a hand lens.
a) Draw and label specimen **W**.
(5mks)
b) Give **two** pieces of evidence to show that the specimen is well adapted for locomotion in its habitat.(2mks)
c) State **two** features observed on the specimen to show that the specimen has capacity for irritability.
(2mks)
d) Using a hand lens, examine specimen W_2 which has been removed from specimen **W**.
(i) State the function of W_2. (l mk)
(ii) Name **one** characteristic that adapt specimen $W_2$to its function. (l mk)
e) What is the importance of the following features to the daily survivals of specimen **W**

(i) Silvery pigment of the specimen. (l mk)
(ii) Secretion of mucus beneath the scales. (l mk)