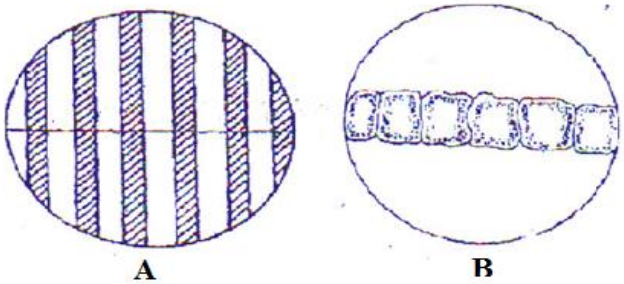
KCSE BIOLOGY 2022 LATEST PREDICTION EXAMS

KCSE PREDICTION 1 2022
PAPER 1

1. Below is an image of a biological vector. Use it to answer questions that follow.

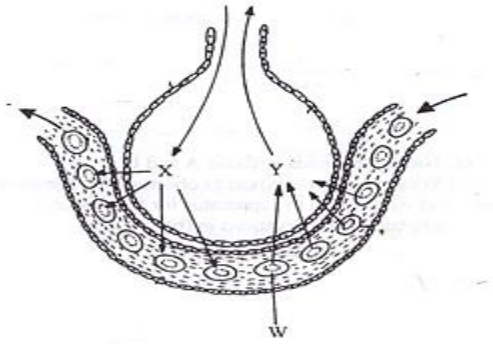
(a) Identify the parasite transmitted into human blood by the organism. (1 mark)
(b) Name the blood cells that are destroyed by the parasite in (a) above. (1 mark)
(c) State one biological method used to eradicate the larvae of this organism. (1 mark)
2. Give the structural adaptations of the following in an insect pollinated plant.
(a) Pollen grain. (1 mark)
(b) Stigma. (1 mark)
3. State the causative agents of the following diseases
(i) Tuberculosis. (1 mark)
(ii) syphilis (1 mark)
4 a) What do you understand by the term ecologically balanced ecosystem? (1mk)
b) Give two reasons for loss of energy from one trophic level to another in a food web (2mks)
5. Identify the following types of responses:
(a) Pollen tube growing towards the ovary (1 mark)
(b) Maggots moving away from light. (1 mark)
6. State two activities of the cell that are controlled by the nucleus. (2 marks)
7. Distinguish between botany and zoology. (1 mark)
8. The field of view of a light microscope appeared as shown below in diagram A and the diameter in A was occupied by cells as shown in B.



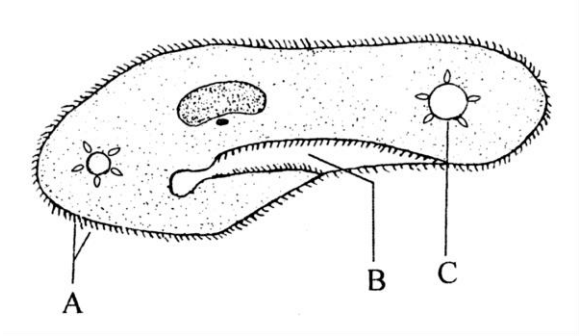
Calculate the length of one cell. (2 marks)

9. State two importance of water in germination of seeds. (2 marks)
10. Why is sexual reproduction advantageous in flowering in plants? (2 marks)
11. Below is an illustration of an organism captured by students during a practical lesson.

(a) Identify two features that enable the organism to be placed in the phylum Arthropoda. (2 marks)
(b) Explain why the organism will die when Vaseline is applied on its thorax. (1 mark)
12. Name two properties of enzyme amylase. (2 marks)
13. State the significance of natural selection. (2 marks)
14. Explain why a plant shoot develops lateral branches when its tip is removed. (2 marks)
15. Why is eating a lot of biscuits harmful to the teeth. (2 marks)
16. a) Name the part of the chloroplast where each of the following activities take place.
i) Light stage……..(1mk)
ii) Dark stage…….(1mk)
b) Name two types of cells in a leaf that carry out photosynthesis (2mks)
17. State any three disorders due to Gene mutation in human beings (3 marks)
18. Why is it important that the radicle develops first during germination? (2 marks)
19. (a) Explain one event of mitosis that restores the genetic constitution of an organism. (1 mark)
(b) Identify the following types of cell division:
(i) Division of generative nucleus into male nuclei. (1 mark)
(ii) Division of cells lining the seminiferous tubules. (1 mark)
20. State two observable characteristics that show discontinuous variations in *Drosophila melanogaster* (2 marks)
21. Explain why athletes breathe quickly and deeply after a 100 meters sprint. (2 marks)
22.(a) State two proteins that determine human blood groups. (1 mark)
(b)(i) What is the role of blood capillary? (1 mark)
(ii) Explain why blood does not clot in undamaged blood vessels. (1 mark)
23.(a) List one type of chromosomal aberrations. (1 mark)
(a) State one advantage of polyploidy in modern farming. (1mark)
24. Explain:
(a) Why insulin is not administered orally. (1 mark)
(b) Why stomach wall is lined with mucus (1 mark)
25.(a) what is homeostasis? (1 mark)
(b) State two behavioral mechanisms used by snakes to increase their body temperature. (2 marks)
26. Explain why only a small amount of food materials taken up by herbivores is passed on to secondary consumers. (2 marks)
27. Below is a diagram of a respiratory surface. Use it to answer questions that follow.



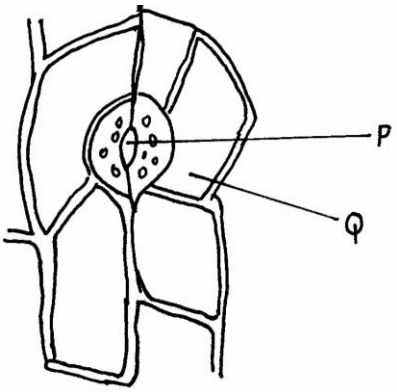
(a) Name the physiological process involved in the exchange of gases in the structure above. (1 mark)
(b) Identify the substance in cell labeled w that has high affinity for gas X. (1 mark)
(c) State the advantage of gas Y being transported in cells labeled W (1 mark)
28. (a) Explain why when transplanting a young plant, it is advisable to remove some leaves. (2 marks)
(b) Give one role of xylem vessels other than transport (1 mark)
29. Study the diagram below and answer the question that follows:



(a) Name the kingdom from which the organism belongs to. (1 mark)
(b) State the function of the structure labelled **C**. (1 mark)
30. State two characteristics of a bony fish which enable it to reduce friction in water. (2 marks)
31. (a) Identify the structural difference between the wing of a bird and the wing of an insect (1 mark)
(b) Identify the type of evolution exhibited by the wings of birds and insects and state the name given to such structures. (2 marks)
32. Name two characteristics that are controlled by the gene located on:
i) Y chromosomes (2mks)
ii) X chromosomes (2mks)
33. (a) what is the role of a pollen tube. (1 mark)
(b) Identify the role of the following hormones in males:
(i) Follicle stimulating hormone. (1 mark)
(ii) Testosterone. (1 mark)

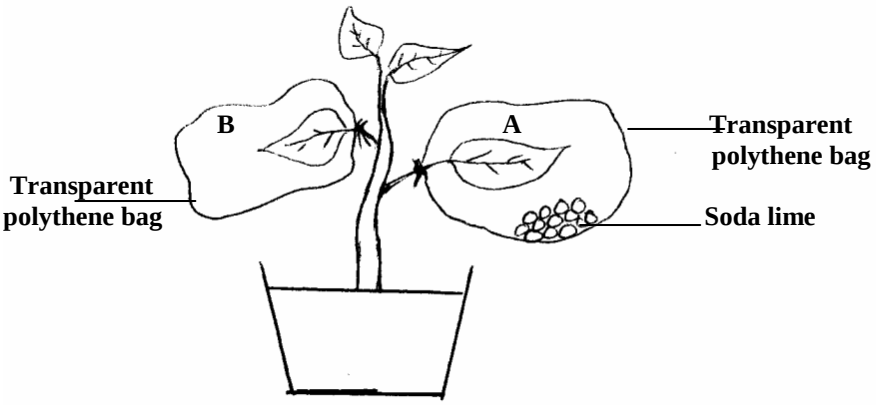
PA PER 2

1. The diagram below shows a portion of a lower epidermis of a sukuma wiki leaf.



a) Name the parts labeled P and Q. (2mks)
b) Briefly describe the photosynthetic theory of stomata opening. (5mks)
c) State one modification in the stomata of xerophyte plant other than being sunken and hairy.

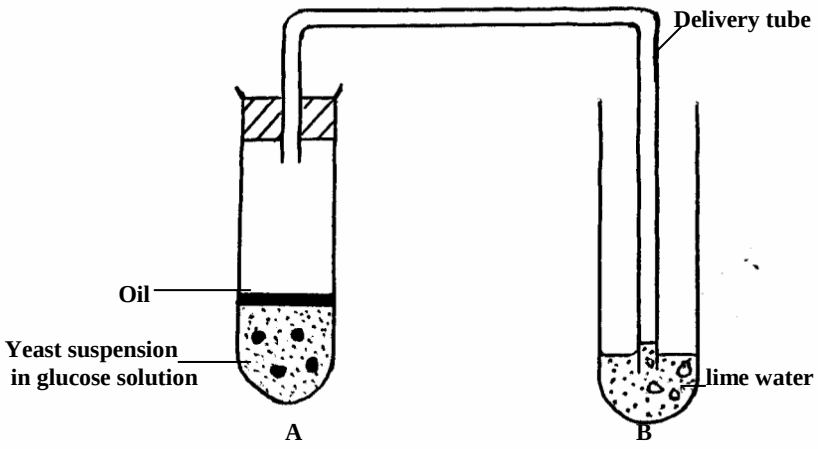
2. The diagram below represents an experimental set-up to investigate an aspect of photosynthesis.



The set up was placed in darkness for 24 hrs and then exposed to light for 5 hrs.

(a) **What** was the aim of the experiment? (1mark)
(b) Leaves **A** and **B** were tested for starch.
(i) **What** would be the expected results? (2marks)
(ii) **Give** reasons for your answer in (b) (i) above. (2marks)
(c) **What** was the role of leaf **B** in the experiment (1mark)
(d) **Why** was the set – up placed in darkness for 24 hours? (1mark)
(e) **Name** the organelle in a plant where photosynthesis takes place (1mark)

3. The diagram below illustrates an experiment to demonstrate a certain biological process.



Before adding yeast suspension in tube **A**, the glucose solution was first boiled and cooled.

a. **What** biological process was being demonstrated? (1mark)

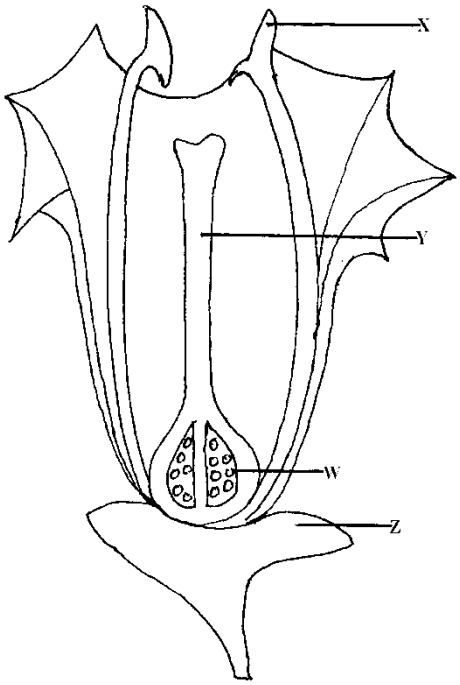
(b) (i) **What** observation would be made in tube **B** after 20 minutes of the experiment?

(ii) **Account** for the observations made in (b) (i) above (2marks)

(c) **Write** down an equation to summarize the reaction taking place in tube **A**. (1mark)

(d) **State two** industrial applications of the chemical reaction taking place in tube **A**. (2marks)

4. The diagram below represents a flower.



(a) **Name** the parts labeled X and Y. (2mks)

(b) **Describe** the ovary position. (1mk)

(c) (i) **Suggest** an agent of pollination of the flower above (1mk)

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

(d) On the diagram above, which part do you expect to find haploid nucleus after meiosis? (1mk)

(e) In the flower above its sepals cell was found to have 20 chromosomes. **What** would be the number of chromosomes found in the endosperm cell of the flower embryo sac after fertilization? (1mk)

(f) **State one** way in which flowers prevent self – pollination. (1mk)

5. When the offspring of purple and white flowered pea plants were crossed, they produced purple and white flowered plants in the ratio of 3: 1

Using letter H to represent the gene for purple colour

(a) State the genotype of:

(i) Parents (2 mks)

(ii) F_1 Generation (1 mk)

(b) Work out the cross between plants in the F_1 generation (4 mks

(c) Account for the colour the flowers in plants of the F_1 generation

SECTION B (40 marks)

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

6. In an experiment to investigate the effect of temperature on the activity of salivary amylase enzyme, test tubes containing 5 cm^3 of starch solution were placed in water baths maintained at different temperatures. After 30 minutes, 0.1cm^3 amylase solution was added into each of the tubes.

At one minute intervals, a drop of the mixture in each tube was tested for presence of starch. The time taken for all the starch to be digested was taken and recorded. The results were as shown in the table below.

Temperature (^{0}c)	5	10	15	20	25	30	35	40	45
Time taken to digest all starch (mins)	80	60	48	26	18	9	3	14	75

(a) On the grid provided **plot** a graph of time taken to digest all the starch against temperature.

(b) **What** was the optimum temperature range for this enzyme? (1mark)

(c) **Account** for the results obtained at

(i) 5^0C (2marks)

(ii) 45^0C (2marks)

(d) Apart from temperature **name three** other factors that would affect the above reaction.(3marks)

(e) **Name two** regions in a human body where digestion of starch occurs. (2marks)

(f) (i) **Give three** metallic ions that act as enzyme co- factors in a human body. (2marks)

(ii) **What** is the role played by enzyme co- factors in the physiology of human body? (1mark)

(g) **Name** the major respiratory substrate in a mammalian body during severe starvation. (1mark)

7. How are leaves of mesophytes suited to their function? (20mks)

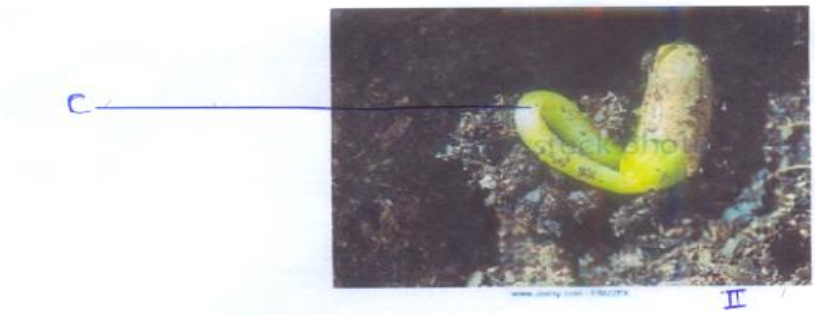
8. Describe the adaptations of the mammalian skin to its functions. (20mks)

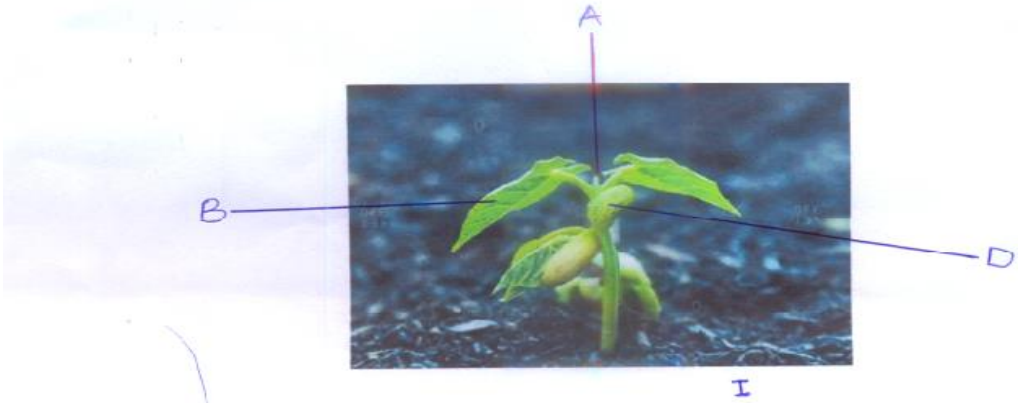
PAPER 3 (PRACTICAL)

1. You are provided with solution W in a boiling tube. Using the provided reagents, carry out possible food tests to identify food substances present in solution. **(14marks)**

FOOD SUBSTANCE	PROCEDURE	OBSERVATION	CONCLUSION

2. Examine the photographs I and II of seedling specimen shown below and answer the questions that follows;





a) Name the parts labelled A, C and D. **(3 marks)**

b)(i) Name the class to which the specimen belongs. **(l mark)**

(ii) Give two reasons, using observable features to support your answer in (b) (i) above **(2 marks)**

(c) Give two functions of the structure labeled D. **(2 marks)**

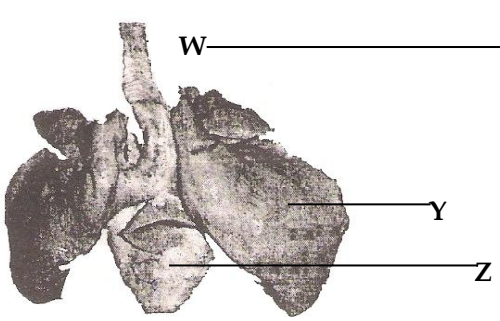
d) Explain how the curvature labeled C is formed **(3marks)**

e) Name the type of germination exhibited by the seedlings. Give a reason for your answer. **(2marks)**

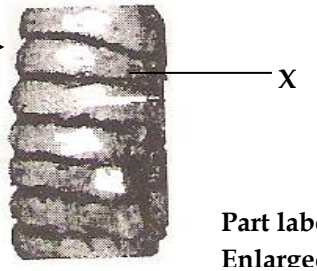
Type

Reason

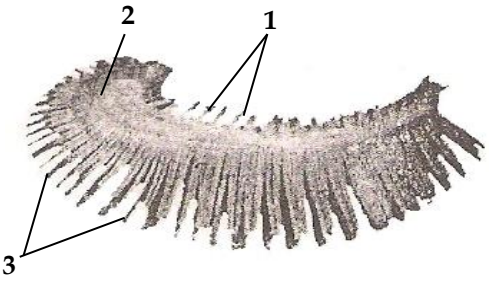
3. Below are photographs labelled J and K of organs obtained from different animals. The organs perform similar functions. Examine them.



Photograph J



Part labelled W Enlarged



Photograph K

a) Name the phylum to which the organs were obtained fr **(1 mark)**
b) Identify the organs. **(2 marks)**
c) State the function performed by the organs. **(1 mark)**
d) Name the parts labelled X, Y and Z in **photograph J** **(3 marks)**
e) Identify the parts labelled 1, 2 and 3 in **photograph K**. **(3 marks)**
f) Using observable features, state how the parts labelled **1** and **3** you identified in **(d)** above are adapted to their functions **(3 marks)**

KCSE PREDICTION 2 2022
PAPER 1

1. State the advantages of internal fertilization in mammals (2mks)
2. a) State the ideas proposed by Lamarck in his theory of evolution (2mks)
   b) Why is Lamarck's theory not acceptable? (1mks)
3. What is meant by the term irritability? (1mk)
4. State three aspects that can be used to estimate growth in seedlings (3mks)
5. Name the organelle that is involved in each of the following
   a) Manufacture of lipid (1mk)
   b) Formation of lysosomes (1mk)
6. State the importance in living organisms
   a) Nutrition (1mk)
   b) Excretion (1 mk)
7. Explain the meaning of the following
   a) Flaccid cell (1mk)
   b) Crenated cell (1mk)
8. Explain the following

a) Ovaries can be removed from a human female after the fourth month of pregnancy without terminating the pregnancy (2mks)

b) Human testes are located to hang outside (2mks)

a) Explain how a human stomach is adapted to;

i) Protein digestion (2mks)

ii) Churning (2mks)

9. State three characteristics of class crustacea (3mks)

10. a) Describe the condition known as varicose veins (2mks)

b) What is the role of blood platelets in the blood clotting process (2mks)

11. What would be the expected results of a test cross? (2mks)

12. a) Name the products of anaerobic respiration in;

i) Plants (1mk)

ii) Animals (1mk)

b) What is oxygen debt? (1mk)

13. a) Explain how the following occur during gene mutation

i) Deletion (1mk)

ii) Inversion (1mk)

b) What is mean by the term allele? (1mk)

14. a) Name the compound that stores energy released during oxidation of glucose (1mk)

b) Explain what happens to excess amino acids in the body (3mks)

15. Explain the role of the following hormones in plants

a) Florigen (1mk)

b) Ethene (1mk)

16. An individual is blood group B positive

a) Name the antigens in the individuals blood (2mks)

b) Give the reason why the individual cannot receive blood from a blood group A donor (2mks)

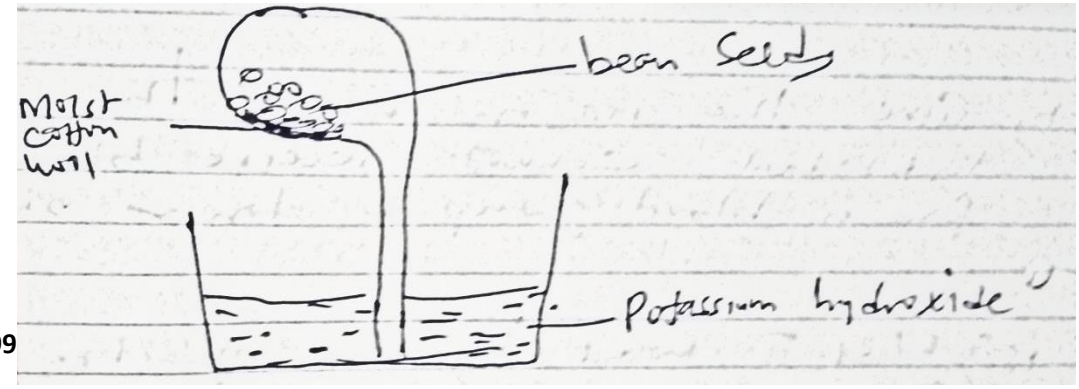
17. a) What is meant by each of the following

i) Pyramid of numbers (1mk)

ii) Pyramid of numbers (1mk)

b) During an ecological visit to Savannah grassland, students were able to see lions, antelopes, vultures and pastoralists grazing their cattle. Construct a food chain with four consumer levels to illustrate the energy flow in the ecosystem. (2mks)

18. A group of students placed some bean seeds on moist cotton wool in a retort flask as shown below

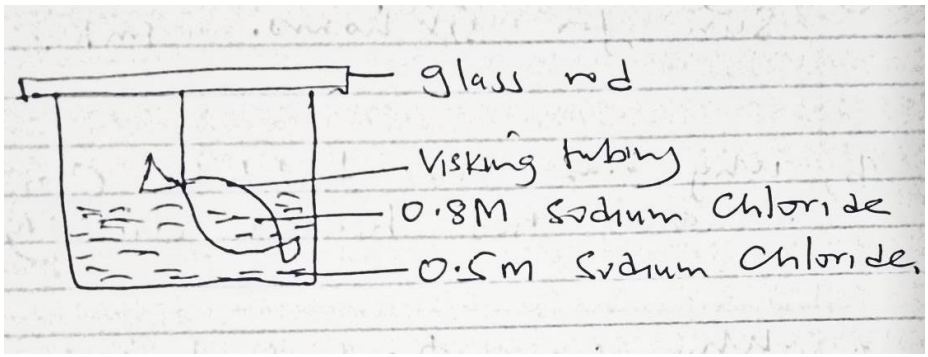


a) Explain the expected observation after three days (3mks)
b) State the control experiment for the observation above (1mk)

19. a) Name the surface involved in gaseous exchange in a locust (1mk)
b) How is the surface named above adapted for gaseous exchange (4mks)

20. What would happen to a cell if its nucleus was removed? Explain. (2mks)

21. A student set up an experiment to investigate a certain process



a) Identify the physiological process being instigated (1mk)
b) What observation would the student make on the visking tubing after 30 minutes (1mk)
c) Explain your observation in (b) above (2mks)

22. When testing for starch a leaf from a plant that had been kept in the sun for six hours was put in boiling water for 10 minutes. It was then put in a test tube full of ethanol. The test tube containing ethanol was put in a hot water bath. The leaf was then removed and dipped in a beaker of cold water. The leaf was then tested for starch.
a) Why was the plant kept in the sun for six hours (1mk)
Why was the test tube containing ethanol not heated directly (1mk)
b) Why was the leaf boiled in ethanol (2mks)

23. A certain plant was found to have the following features
- Parallel venation in leaves
- Sheath like petiole
- Flower parts in multiples of three

a) Name the class to which the plants belongs (1mk)
b) Describe how the following characteristics would appear in the plant
i) Vascular bundles in the stem (1mk)
ii) Root system (1mk)

24. The heart of a chicken continued beating minutes after the lead was cut off. Explain (2mks)

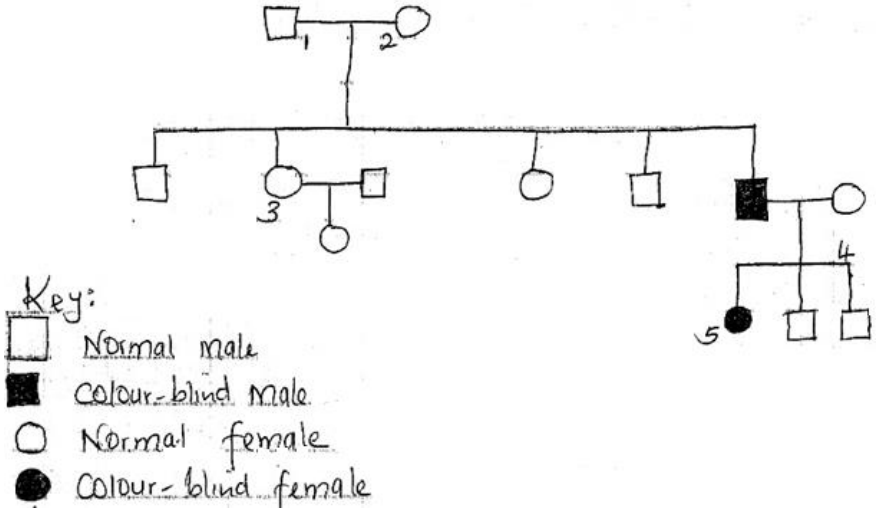
a) Distinguish between homologous and analogous structure (2mks)
b) Explain the term continental drift as used in evolution (2mks)

PAPER 2

SECTION A (40 MKS)

1. A student boiled some water in a boiling tube and before it cooled down, she covered the surface with a layer of oil. With the water maintained at 37° C. She introduced a mixture of glucose and yeast into the boiling tube. Corked it and fixed a delivery tube, the other end of the delivery tube was immersed into lime water that had been put in a test tube. The set up was left maintained at 37 °C for 30 minutes within which observations were made.
   (a) What was the aim of the experiment? (1 mark)
   b) Why was it important to boil the water at the start of the experiment (1mark)
   c) Write down three observations made within the 30 minutes time. (3 marks)
   d) Account for the observations made in (c) above. (3 marks)

1. The pedigree diagram shows the inheritance of colour blindness (Daltonism) in a family. Colour blindness is sex-linked and is caused by a recessive allele (d). The ability to see colour normally is caused by a dorminant allele (D)



a) How many of the male offspring of parents 1 and 2 were normal? (1mk)
b) State the genotype of:
   i) Individual 2 (1mk)
   ii) Individual 5 (1mk)
   c) A person with a recessive allele for colour-blindness may not be colour blind. Explain why males with allele for colour-blindness are always colour-blind. (1mk)
   d) If individual 5 marries a normal male, what percentage of their daughters will have an allele for colour-blindness but will not be colour-blind? Show your working. (4mks)

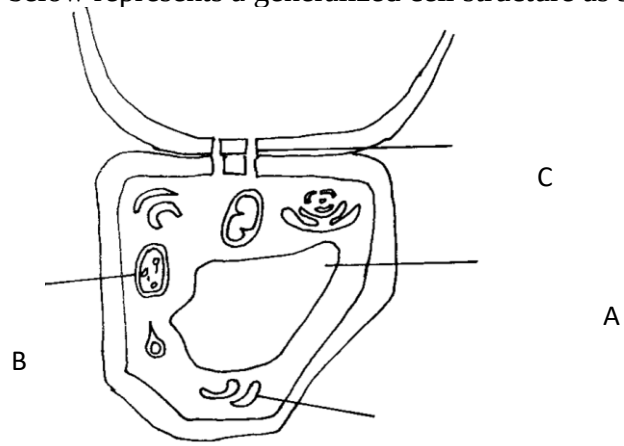
3. The following table gives information about concentration of substances in samples of blood plasma, filtrate from the glomerulus and urine.

Substance	Concentration in sample ($g/100cm^3$)		
	Blood plasma	Glomerular filtrate	Urine

Glucose	0.10	0.10	0.00
Protein	8.00	0.00	0.00
Salts	0.90	0.90	2.70
Urea	0.03	0.03	1.80

a) Protein is not filtered out of blood plasma
i) Use evidence from the table to support this statement. (1mk)
ii) Explain why protein is not filtered out of the blood plasma. (1mk)
b) The table shows that glucose is present in the filtrate from the glomerulus but not in the urine. Explain why glucose is not present in the urine. (1mk)
c) Urea is formed by the deamination of excess amino acids. Describe how deamination occurs (5mks)

4. The diagram below represents a generalized cell structure as seen under an electron microscope.

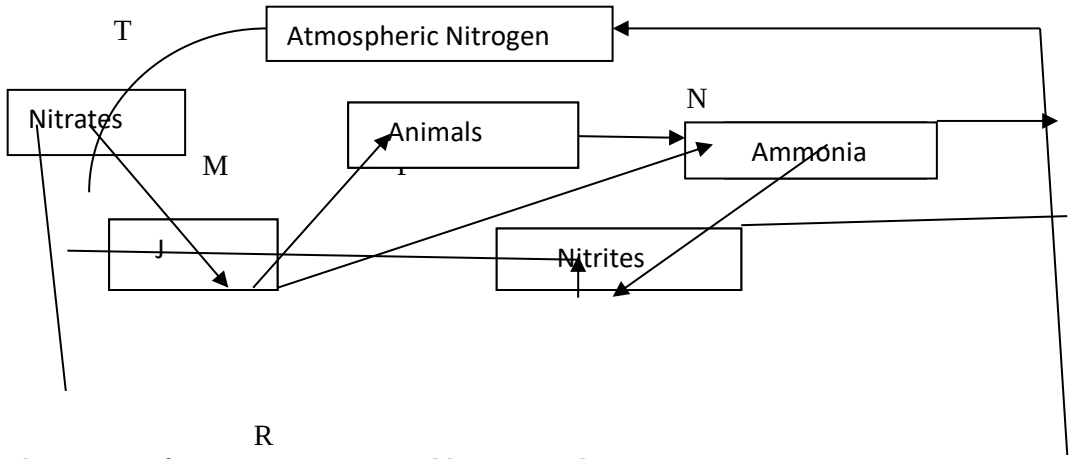


a. Name the structures labeled A,B and C (3mks

b. How is the structure labeled B adapted to its function (2mks)

c. What difference would be observed between electron micrograph obtained from cheek cell of a frog and the one above (3mk)

5. The diagram below represents a nitrogen cycle



a) Name the groups of organisms represented by J (1mk)

b) Name the process represented by R, P M and N (4mks)

c) Name one process represented by T (1mk)

d) i) Name a structure in roots involved in process M (1mk)

ii) State one adaptation of structure named in (d) (i) above to its function (1mk).

SECTION B (40 MARKS)

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

6. In an experiment, the population growth of yeast cells in a Petri dish was determined over a period of 75 minutes. The results below were obtained.

TIME IN MINUTES	NUMBER OF YEAST CELLS
0	4
5	6
10	8
15	10
25	30
30	50
35	80
40	120
45	140
50	150
55	160
65	166
75	166

(a). Using a suitable scale , plot a graph on the grid provided of number of cells against time in minutes (6 marks)

(b). Name the type of the curve you have drawn. (1 mark)

(c) Determine the number of yeast cells after 37 minutes. (1 mark)

(d)After how long was the population of yeast cells 144? (1 mark)

(e). Work out the rate of cell division between 32 minutes and 42 minutes. (2 marks)

(f). Account for the shape of graph between 45th minute and 60th minute. (3 marks)

(g). In a field study to estimate the population of grasshoppers in the school field of $4km^{2,,}$ 60 grasshoppers were caught using sweep nets, marked with red paint and released back to the field. The following day students went back with their sweep nets and caught 100 grasshoppers, in which 20 were found to be already marked.

(i).calculate the population size of grasshoppers in the field. (2 marks)

(ii). Calculate the population density of the grasshoppers in the field. (2 marks)

(iii) What factors would maintain the population of grasshoppers and yeast cells at the carrying capacity. (2 marks)

7. a) Describe the process of fertilization in a flowering plant. (15mks)

b) State the changes that take place in a flower after fertilization (5mks)

8 (a) Describe the adaptation of hydrophytes to their photosynthetic function. [10mks]

(b)Explain how mammalian ileum is adapted to perform its function. [10mks]

PAPER 3

1. you are provided with specimen labelled E and 0.01% DCPIP. Examine specimen E and answer the questions that follow.

(a)(i) What part of the plant is the specimen E (1mk)

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

(b) Cut a transverse section through specimen E.

(i) Draw and label one of the cut surface (4mk)

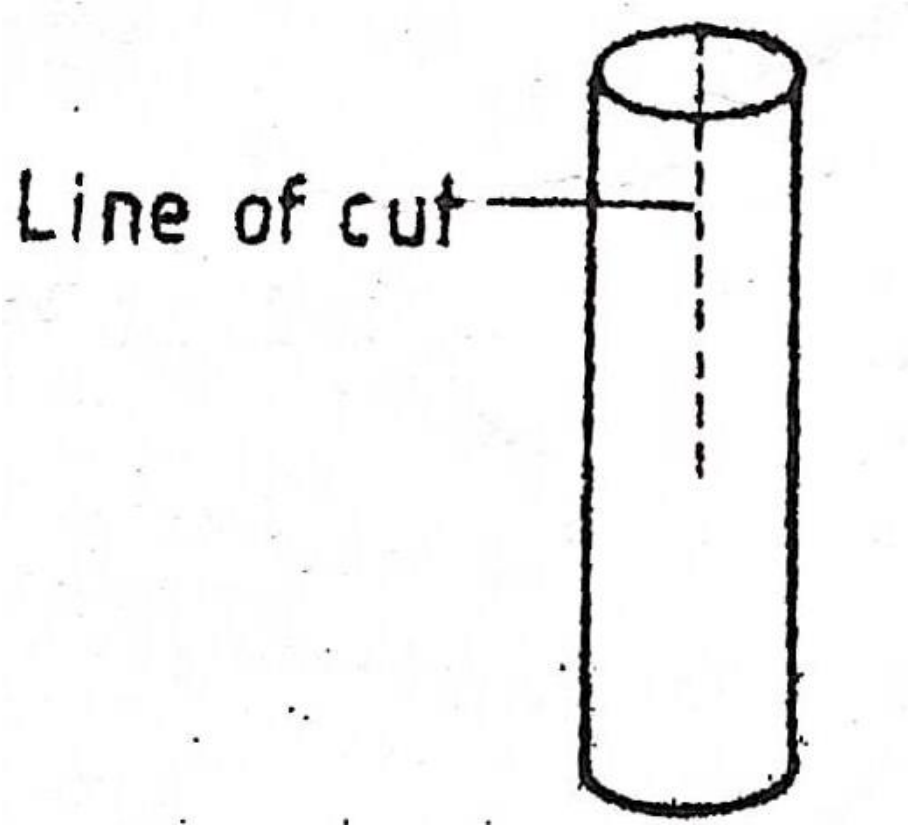
(ii) State the type of placentation of specimen E (1mk)

(c) State how specimen E is adapted to its mode of dispersal. (2mks)

(d) Squeeze out the juice from specimen E into a beaker. Filter and discard the residue. Use the reagent provided to test for the food substance present in juice obtained from specimen E. Observe and record in the table below. 3mks)

Procedure	observation	conclusion

2. You are provided with two pieces of plant material labeled D. Using a scalpel cut a slip halfway through the middle of each piece as shown in the diagram below.



Place one piece in the solution labelled L_1 and the other in solution L_2. Allow the set up to stand for 30 minutes.

(a) After 30 minutes remove the pieces and press each gently between the fingers

(i) Record your observations

L_1

L_2

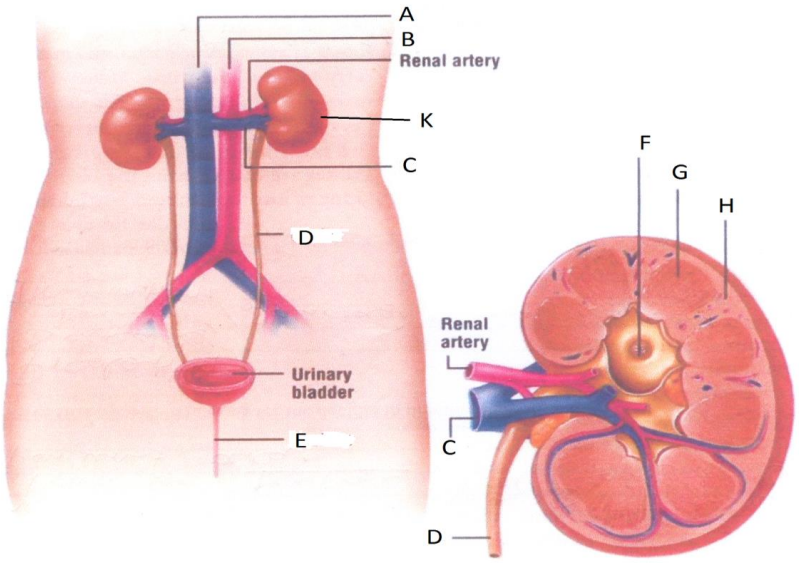
(ii) Account for the observations in (a)(i) above. (2marks)

(b) Examine the pieces.

(i) Record other observations beside those made in (a) (i)above. (2 marks)

(ii) Account for the observations in (b) (i) above. (6marks)

3. The photograph below represents human male urinary system. Study it carefully and answer the questions that follow.



Longitudinal Section of **K**

(a) State **two** functions of the part labeled K. (2 marks)
(b) Name the parts labeled **A, B, C, D, F, G, and H.** (7 marks)
(c) State the functions of each of the following parts;
i) Renal artery (1 mark)
ii) Urinary bladder (1 mark)
iii) Part labeled **E** (1 mark)
(d) (i)State one part of the nephron found in the region labelled **G.** **(1mark)**
(ii**)** Name two kidney disorders (2marks
(iii)Name the hormone that is responsible for reabsorption of water in the renal tubule. (1mark)

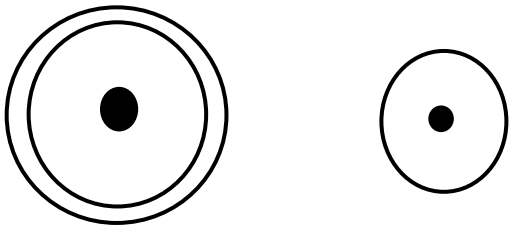
KCSE PREDICTION 3 2022

PAPER 1

1. Name the reagent used for testing presence of (3 **marks**)
   (a) Starch
   (b) Reducing sugars
   (c) Vitamin c
2. State the processes which occur in each of the following organelles. (2 **marks**)
   (a) Chloroplast
   (b) Mitochondrion
   (c) Ribosomes
3. A student observed a specimen through a light microscope. He used the objective lens marked X40.If he indicated the magnification of the image as x 400, what was the eye - piece magnification?(Show your working). (3 **marks**)
4. State the function of the following in mammalian trachea. (3 **marks**)
   (a) Rings of cartilage
   (b) Mucus
   (c) Cilia
5. (a) What do you understand by the term biological control? (1 **mark**)
   (b) Explain why all the energy produced by producers does not flow to the tertiary consumers. (2**marks**)
6. Name any three forces that maintain the transpiration stream (3 **marks**)
7. Give the form in which the following gases are transported in blood. (3 **marks**)
   (a) Oxygen
   (b) Carbon (IV) oxide
   (c) Carbon (II) oxide
8. (a) Name the main group of organisms which comprise the Kingdom Monera. (1**mark**)
   (b) State any three ways in which the organisms named in 8 (a) above affect human lives. (3**marks)**
   (d) State the main characteristics of Monera which distinguish it from all other kingdoms.(1 **mark)**
9. State ways in which the xylem tissue is adapted to carry out its function. (3**marks**)
10. Why is it necessary for an athlete to breathe heavily after running? (2 **marks**)
11. State ways in which the following diseases can be prevented
    (a) Typhoid and amoebic dysentery (2 **marks)**
    (b) Malaria (2 **marks**)
12. What are the three distinguishing features of phylum Arthropoda? (3**marks**)
13. (a) Name the main product of the dark stage of photosynthesis. (1**mark**)
    (b) What is the role of chlorophyll during photosynthesis (2**mark**)
14. Name three mechanisms that prevent self-pollination in flowers that have both male and female parts. (3 **marks**)
15. State three applications of anaerobic respiration. (3 **marks**)
16. What is the significance of highly folded inner membrane of a mitochondrion? (2 **marks**)
17. Why is it necessary for blood from the gut to pass through the liver before joining general circulation(2 **marks**)
18. A person's urine tested positive for reducing sugars.
    (a) Name the type of sugar present in the urine. (1**mark**)
    (b) Name the gland and the hormone which failed to control the above condition.(2**marks**)
    Gland
    Hormone

(c) Which disease was the person suffering from? (1**mark**)

19. State two roles played by the process of reproduction. (2**marks**)
20. What is the habitat of the following plants? (3**marks**)
    (i) Xerophytes
    (ii) Hydrophytes
    (iii)Halophytes
21. (a) State ways in which molars are adapted to their functions. (2**marks**)
    (b) Name any two dental diseases. (2 **marks**)
22. How is the sperm cell adapted to carry out its function? (3 **marks**)
23. The following are diagrams of two pollen grains.



K **L**

    (a) State one observable difference between K and L. (1 **mark**)
    (b) State the agent of pollination for each of them. (2 **marks**)
24. How do sunken stomata reduce transpiration? (2**marks**)
25. Give the classes to which the following animals belong. (3**marks**)
    (a) Human being
    (b) House fly
    (c) Spider
26. (a)State one event that occurs in prophase of meiosis I which does not occur in prophase of mitosis. (1 **mark**)
    (b) What are the results of the above phenomena? (2 **marks**)
27. Explain why growing grass die a few days when salt is sprinkled on it. (3**marks**)

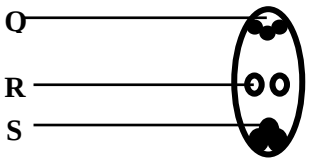
PAPER 2

1. (a)What is meant by the following terms?
    (i) Protandry (1**mark**)

(ii) Self sterility (1**mark**)

(b) The diagram below shows a stage during fertilization in a plant.

Pollen



(i) Name the parts labelled Q,R and S (3 **marks**)

(ii) State two functions of the pollen tube (2 **marks**)

(c) On the diagram label the microphyle. **1mark**)

2. (a) Explain what happens to excess amino acids in the liver of humans. (3**marks**)

(b) Which portions of the human nephron are only found in the cortex? (3 **marks**)

(c) (i) What would happen if a person produced less antidiuretic hormone? (1 **mark**)

(ii) What term is given to the condition described in C (i) above? (1**mark**)

3. (a) (i) What is meant by the term biological control? (1**mark**)

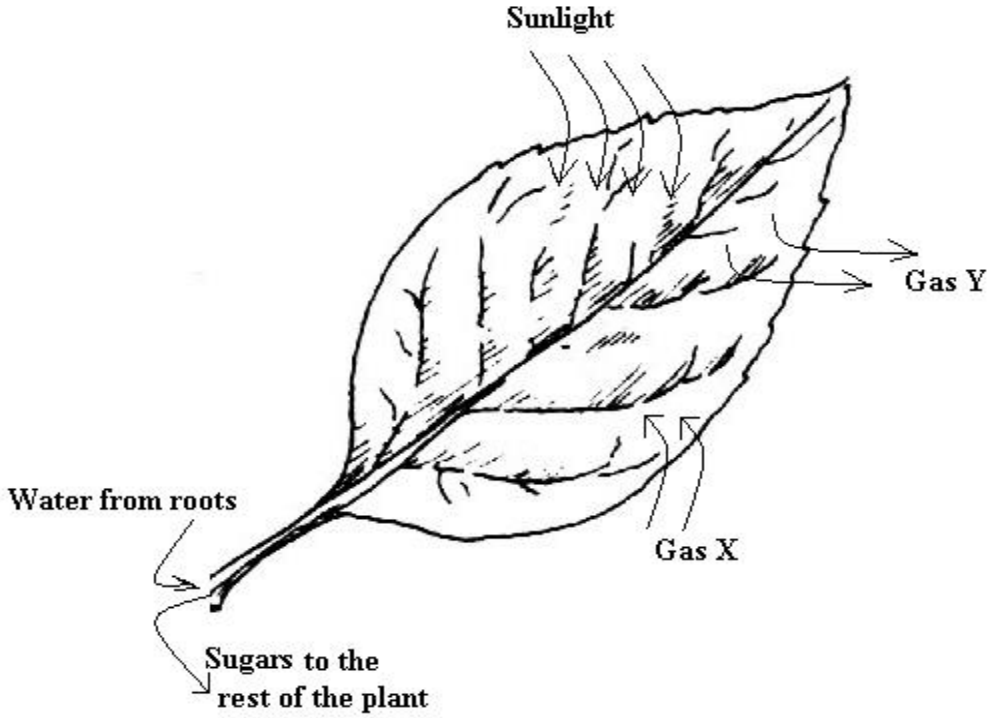
(ii) Give an example of biological control. (1**mark**)

(b) (i) What is eutrophication? (3**marks**)

(ii) What are the effects of eutrophication? (3 **marks**)

(c) Name a substance that is responsible for acid rain. (1**mark**)

4. Leaves are the organs of photosynthesis. The following diagram shows what happens in a plant leaf during photosynthesis.



Give two ways in which leaves are adapted to absorb light. (2 **marks**)

(a) Name the gases labelled X and Y. (2**marks**)

(b) Name the tissue which transport:

(i) Water in to the leaf. (1 **mark**)

(ii) Sugars out of the leaf. (1 **mark**)

(c) Explain why it is an advantage for the plant to store carbohydrates as starch rather than as sugars.(2**marks**)

5. Some millet seeds were socked in water for two days. They were then broken into small pieces and placed on the surface of agar containing starch. After two days it was found that the agar no longer contained starch.

(a) Suggest how the test for starch in the agar was carried out. (1 **mark**

(b) Explain why there was no starch in the agar after two days. (2**marks**)

(c) Why was it necessary to soak the seeds? (1**mark**)

(d) Why were the millet seeds broken into small pieces? (1**mark**)

(e) State the observation that would be made if the seeds had been soaked in boiling water?(1**mark**)

(f) Suggest a control experiment that would have been suitable. (2**marks**)

SECTION B:

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

6. A research was carried to determine the trend of growth of some boys and girls.Their average mass in kilograms was taken separately for a period of 20 years and tabulated as shown in the table below.

Age	Average mass of boys (kg)	Average mass of girls (kg)
0	2.5	2.5
2	11.5	11.5

4	15.0	16.0
6	18.5	19.3
8	22.1	27.1
10	25.1	27.1
12	27.5	30.5
14	37.0	35.5
16	44.0	44.0
18	46.9	52.0
20	48.5	55

(a) On the same axis draw a graph of the average mass of the girls and boys against age. (7**marks**)
(b) From the graph , determine the;-
(i) Mass of boys at the age of 11 years. (1 **mark**)
(ii) Growth rate of girls between ages 13 and 15. (3 **marks**)
(c) Account for the change in the mass of girls during the age stated in (ii) above.(2 **marks**)
(d) Explain the trend observed in the curves for both boys and girls. (2 **marks**)
(e) Why do girls above 10 years require in take of food that is richer in iron than boys of the same age?(2 **marks**)
(f) Part from using average mass to estimate growth in human beings, name two other parameters that can be used. (2 **marks**)

7. Describe how the various parts of the human digestive system are adapted to their functions.(20 **marks**)
8. (a) State the causes of air pollution. (5 **marks**)
(b) State how air pollutants affect organisms hence state how air pollution should be controlled. 15 **marks**)

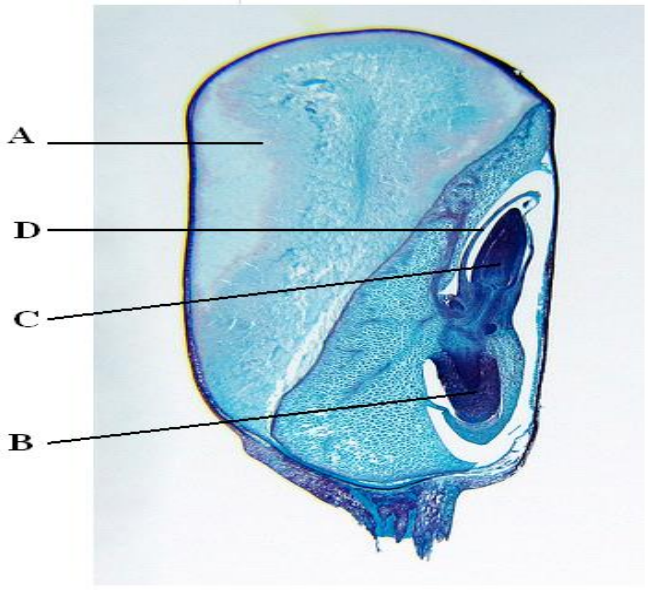
PAPER 3
(PRACTICAL)

1. (a) You are provided with a solution L. Using the reagents provided; determine the food compounds in L. Fill in the table below.

FOOD COMPOUND	PROCEDURE	OBSERVATION	CONCLUSION

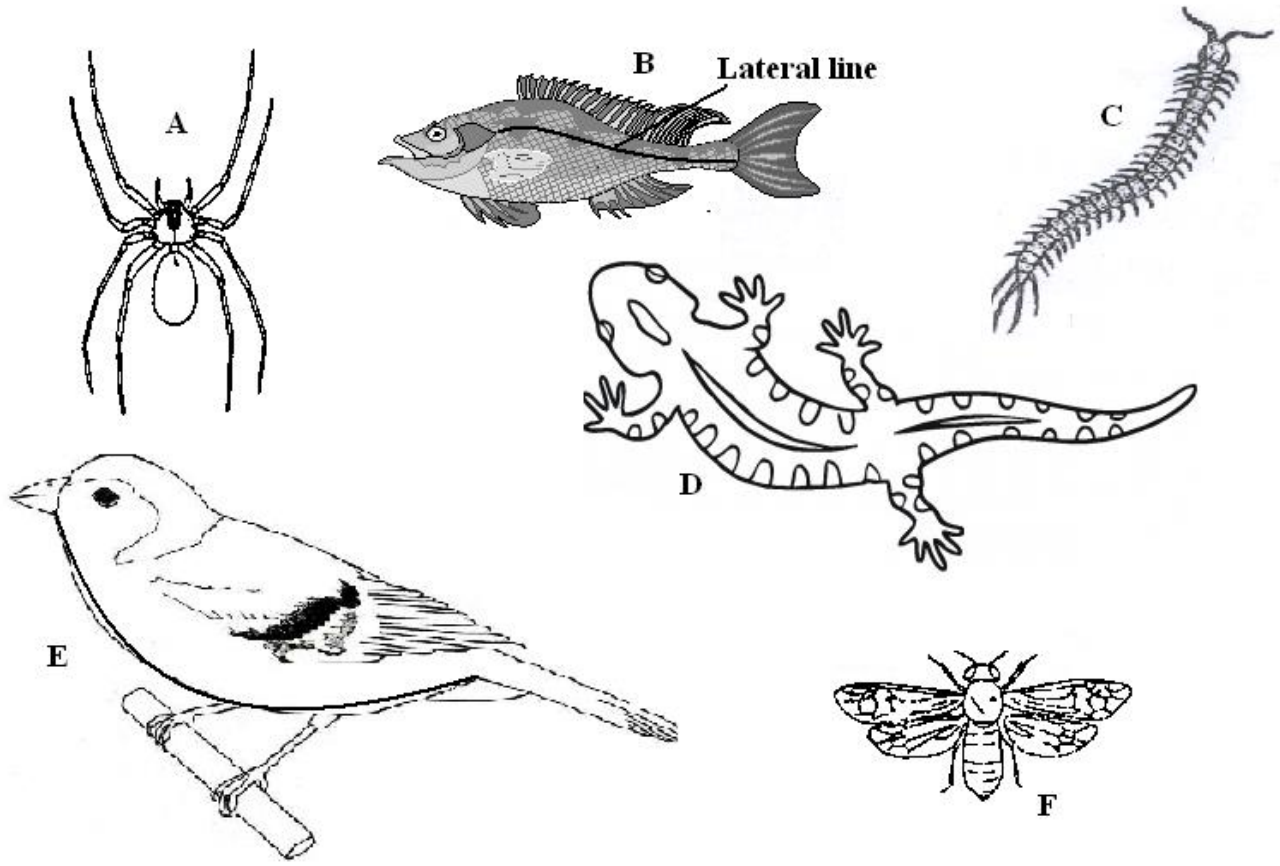
(b) Place 10mls of solution L in a visking tubing. Tie both ends and place it in 50mls of distilled water contained in a beaker.leave the set up for 20 minutes and make observations.
(i) Observations. (1**mark**)
(ii) Account for the observation in b (i) above. (2**marks**)
(iii)Give the equivalent of a visking in the bodies of living organisms. (1mark)

2. Study the photomicrograph of the longitudinal section of a maize fruit below and answer the questions that follow.



(a) (i) Name the parts labelled A, B, C and D. (4**marks**)
(ii) Give the role played by A and D. (2 **mark**
(b) (i) Name the type of germination exhibited by maize grain. 1 **mark**)
(ii) Place the organisms from where the photomicrograph was obtained into its
Kingdom
Division
Class (3**marks**)
(iii) State three characteristics of members of the class identified in b (ii) above (3**marks**)
(c) Give one reason why the maize grain is classified as a fruit. (1**mark**)

3. Study the organisms drawn below and answer the questions that follow.



(a) Use the dichotomous key below to identify the class the organisms belong to. (12 **marks**)

1. (a) Phylum Chordata ..... go to 2
   (b) Phylum arthropoda ..... go to 3
2. (a) Has scales on the body ..... go to 4
   (b) Has no scales on the body .....… Mammalia
3. (a) Has cephalothorax ..... Arachnida
   (b) Has no cephalothorax ..... go to 5
4. (a) Has fins ..... Pisces
   (b) Has no fins ..... go to 7
5. (a) Has three pairs of legs ..... Insecta
   (b) Has more than three pairs of legs ..... go to 6
6. (a) Two pairs of legs per segment ..... Diplopoda
   (b) One pairs of legs per segment ..... Chilopoda
7. (a) Has feathers .....Aves
   (b) Has no feathers ..... go to 8
8. (a) Has a tail ..... Reptilia
   (b) Has no tail ..... Amphibia

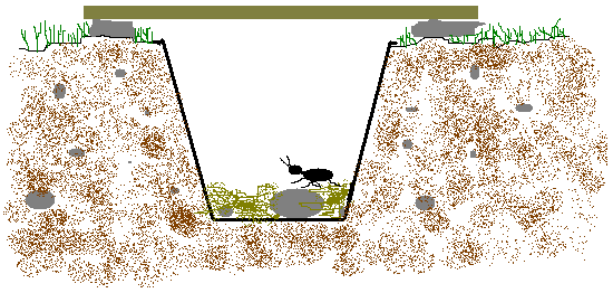
Specimen	Step followed	Identity
A		

B		
C		
D		
E		
F		

(b) If the actual length from the tip of the mouth to the tip of the tail of the specimen B is 100mm, calculate the magnification. (2**marks**)

KCSE PREDICTION 4 2022
PAPER 1

1. State the branch of Biology that would be used in solving the problem of disputed parentage.**(1mark)**
2. A young scientist observed a bird laying her eggs in a nest and later the eggs hatched into chicks. Name two characteristics shown by the chicks that show a chick is a living thing but an egg is not. **(2marks)**
3. Study the diagram below and answer questions that follow

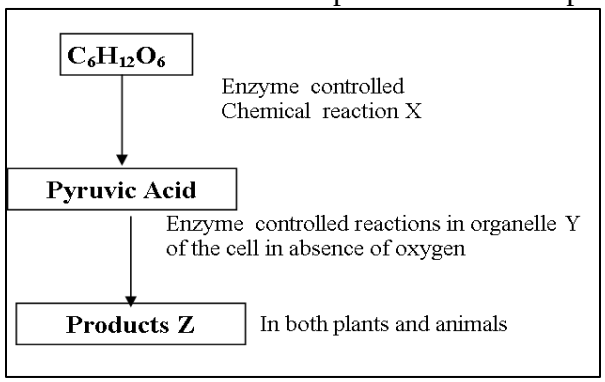


(i) What is the name given to the apparatus shown above **1 mark)**
(ii) What is its use in Biological studies? **(2 marks)**

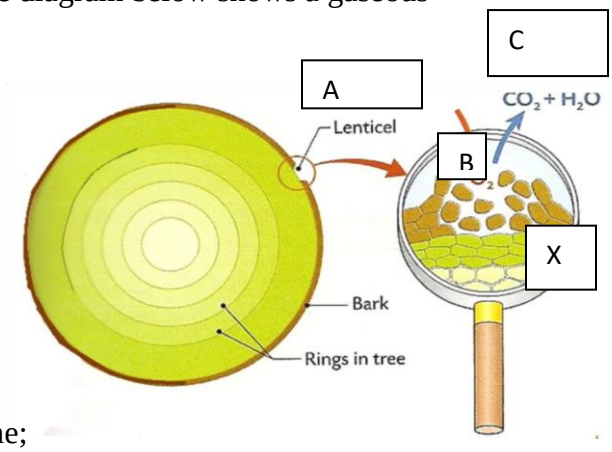
4. a) A form two student observed the leaf shown below.

a) Name the process shown by the leaf. **(1mark)**
b) Differentiate between the process shown above and transpiration **(2marks)**

5. 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.
   a) The pollen tube nucleus. **(1mark)**
   b) A cell of the endosperm. **(1mark)**
6. a) What are fossils? **(1mark)**
   b) State **two** limitations of the use of fossils as an evidence of evolution. **(2marks)**
7. Name the disease of the blood characterized by,
   a) Abnormally large number of white blood cells **(1mark)**
   b) Crescent –shaped hemoglobin **(1mark)**
8. a) State **two** roles of hydrochloric acid secreted by the stomach wall. **(2marks)**
   (b) Name the cells that secrete the above component. **(1mark)**
9. Name the organisms that cause each of the following diseases.
   i) Amoebic dysentery. **(1mark)**
   ii) Bilharzia **(1mark)**
10. Explain how marine fish regulate their osmotic pressure. **(3marks)**
11. A rhinoceros in a national park was found to be infected with ticks. State the trophic level occupied by the :
   (i) Rhinoceros. **(1mark)**
   (ii) Ticks **(1mark)** Study the flow chart below of a process that takes place in both plants and animals.



   a) Name the above process. **(1mark)**
   b) In the above process name the chemical reaction represented by X. **(1mark)**
12. The diagram below shows a gaseous exchange structure in the stems of angiosperms.



Name;

a) Part labelled A. **(1 mark)**
b) Apparatus X. **(1 mark)**
c) Substances represented by arrows B and C. **(2 marks)**

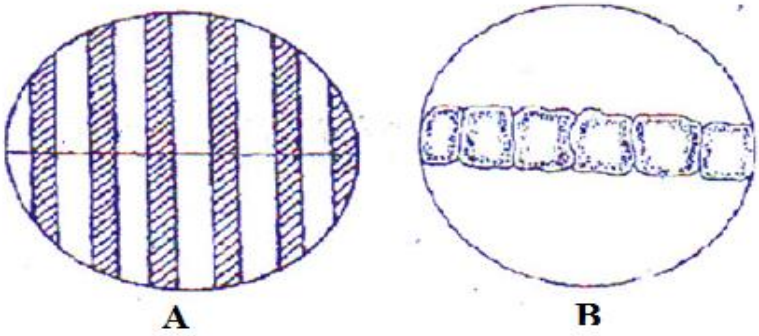
13. When blood is flowing through a vena cava, which main blood vessel will it flow through next? **(1mark)**
14. Below is an image of a biological vector. Use it to answer questions that follow.

(a) Identify the parasite transmitted into human blood by the organism. **(1 mark)**
(b) Name the blood cells that are destroyed by the parasite in (a) above. **(1 mark)**
(c) State one biological method used to eradicate the larvae of these organisms. **(1 mark)**

16. Give the structural adaptations of the following in an insect pollinated plant.
(a) Pollen grain. **(1 mark)**
(b) Stigma. **(2 mark)**
17. Use the illustration below to answer questions that follow.

(a) Identify the type of pollution that has such an effect. **(1 mark)**
(b) State two effects of the type of pollution identified in (a) above to the organism. **(2 marks)**

18. Identify the following types of responses:
(a) Pollen tube growing towards the ovary **(1 mark)**
(b) Maggots moving away from light. **(1 mark)**
19. State two activities of the cell that are controlled by the nucleus. **(2 marks)**
20. The field of view of a light microscope appeared as shown below in diagram A and the diameter in A was occupied by cells as shown in B.

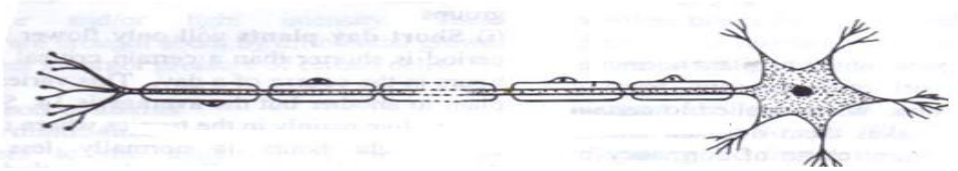


Calculate the length of one cell. **(3 marks)**

21. State two importance of water in germination of seeds. **(2 marks)**
22. Why is sexual reproduction advantageous in flowering in plants? **(2 marks)**
23. Below is an illustration of an organism captured by students during a practical lesson.

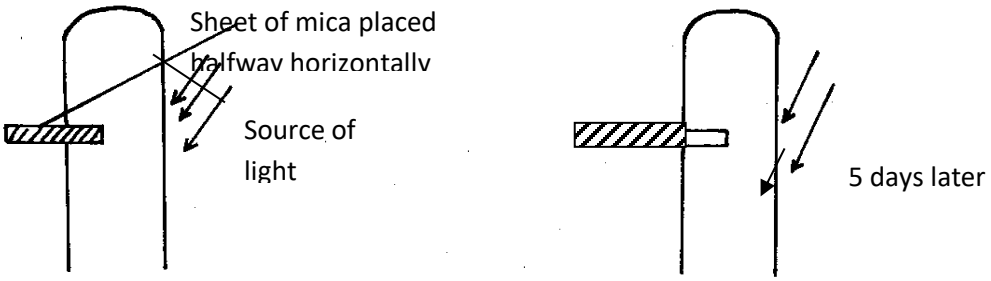
(a) Identify **three** features that enable the organism to be placed in the phylum Arthropoda.**(3marks)**
(b) Explain why the organism will die when Vaseline is applied on its thorax. **(1 mark)**

24. State the significance of natural selection. **(2 marks)**
25. Explain why a plant shoot develops lateral branches when its tip is removed. **(2 marks**
26. The diagram below shows the structure of a neurone.



(a) Identify the neurone and state its function **(2 marks)**
(b) Name the part of the brain that is involved in learning and memory. **(1 mark)**

27. Explain what happens to the structures of the human eye when a student reading a white printed paper on a bright sunny day enters a dark room for examinations. (3 marks)
28. The experiment below was carried out by form four students. The result was recorded below:



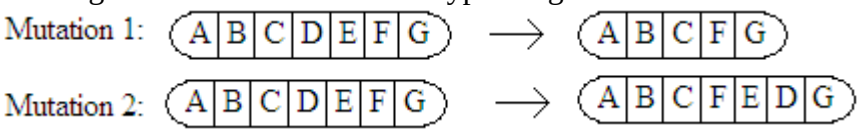
Explain why the shoot doesn't bend towards the light. **(3marks)**

29. In an investigation, a group of students came across animals living in the following habitats. What was the likely main nitrogenous waste product of each in its habitat? **(3marks)**

Habitat	Nitrogenous waste
Terrestrial	
Fresh water	
Marine	

30. **State** the functions of each of the following parts of male reproductive system. **(3marks)**
    a. Sertoli cells ……
    b. Epidydimis……
    c. Seminiferous tubules ……..

31. The diagram below shows various types of gene mutations..



    a. **Identify** the type of gene mutation shown above. **(2marks)**

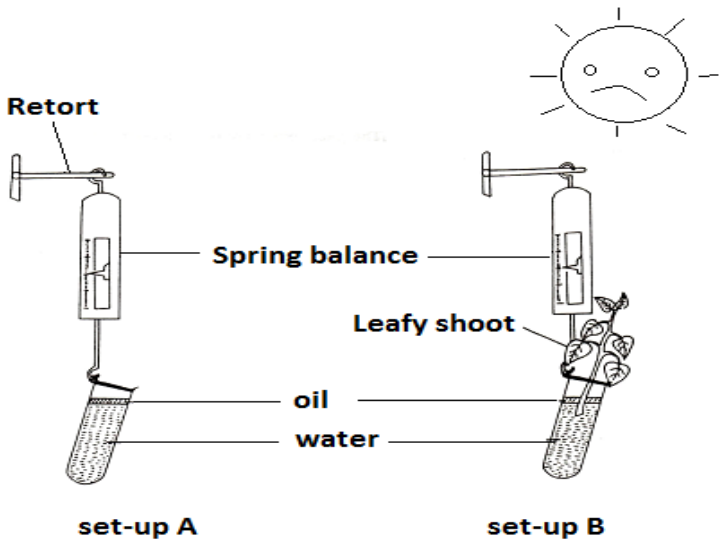
Mutation 1 …….
Mutation 2 …….

    b. **Distinguish** between gene and chromosomal mutations **(2mark)**

PAPER 2

SECTION A (40 MARKS)

1. The set below was used to investigate a certain physiological activity in plants. The two set ups were left under a hot sun for several hours. Study it carefully to answer the questions that follow.



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

(b) What was observed in set-up A and B at the end of the experiment **(2 marks)**

A……..……
……
B……
……

(a) Explain your answer in the (d) above for set-up B. **2 marks)**

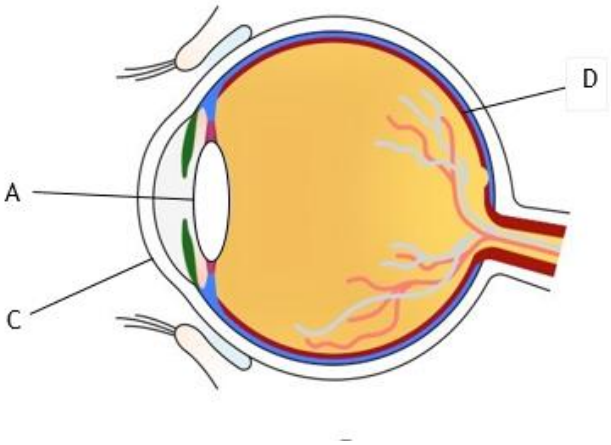
……
……

(b) What do you understand by the terminology guttation? **(1 mark)**

……

(c) Explain how wilting of leaves during a hot day is advantageous to a plant. **(2marks)**

2. The diagram below illustrates the structure in the human eye.

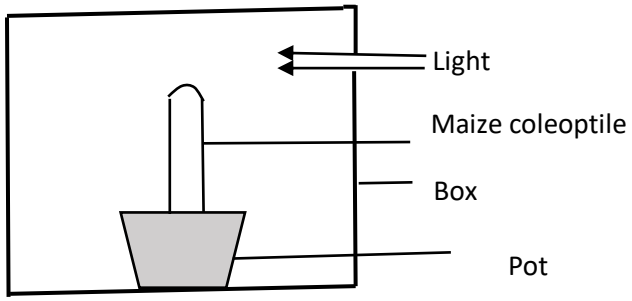


(i) State one way in which the part labelled c is suited to its functions. **(1mark)**

(ii) State the functions of the cells in the part labelled D **(2marks)**

(iii) State the changes that occur in part A to facilitate vision of a distance object. **(2marks)**

b) A student set up an experiment as shown below.



The set up was left for three days.

Account for the expected results after three days **(3marks)**

3. Tongue rolling is dominant over the inability to roll tongue. The father of a family can roll his tongue while the mother cannot. Half of their children can roll the tongue while the other half cannot. Use letter R to denote the tongue rolling trait.

a) Explain with the help of a diagram why only half of the children in the case above inherit the tongue rolling trait from their father. **(4 marks)**

b) If all children could roll the tongue, then what would be the genotype of the mother and father? Explain your answer using a punnet square. **(4 marks)**

c) The micrographs below are of a tissue showing mitosis. Examine it and answer the questions.

R **T**

a.) i. Identify the tissue from which the micrographs were obtained **(1mark)**

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

Name the stages represented by **R** and **T**. **(2marks)**

b.) State two significance of mitosis to an organism. **(2 marks)**

c.) Name two regions in higher plants where cells actively undergo mitosis. **(2marks)**

d) During a laboratory investigation, a scientist extracted gastric juice from the mammalian stomach. He used it to carry out tests on a food sample B which was suspected to contain proteins. He divided the food sample B into three portions and treated them as below.

I. On the 1st portion of B, he added Gastric juice and mixed them thoroughly before adding sodium hydroxide followed with copper (II) sulphate drop by drop.

II. On the 2nd portion of B, he added boiled gastric juice and mixed them thoroughly before adding sodium hydroxide followed with copper (II) sulphate drop by drop.

III. On the 3rd portion of B, he added Gastric juice, sodium bi-carbonate and mixed them thoroughly before adding sodium hydroxide followed with copper (II) sulphate drop by drop.

a) State the observations he made in each set up. **(3marks)**

1st portion……

2nd portion……

3rd portion……

b) Why was the experiment on the 1st portion included in the tests? **(1mark)**

c) Name the property of the chemical being investigated in these tests. **(1mark)**

d) Account for the observations made in 2 (a) above. **(3marks)**

SECTION B (40MARKS)

Answer question 6 **(compulsory)** then choose any between question 7 and 8

6. 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 shown in the table below.

Sulphuric acid concentration (mol/dm^{-3})	Mean root length (mm)	Mean shoot length (mm)
0	55.5	25.2
1×10^{-3}	63.4	18.4
3×10^{-3}	6.5	9.5
4×10^{-3}	2.0	4.6

6×10^{-3}	1.8	0.8
7×10^{-3}	1.5	0.5
8×10^{-3}	1.3	0.3
9×10^{-3}	1.3	0.0
10×10^{-3}	1.0	0.0

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

(b) Describe the relationship between the concentration of sulphuric acid and the:-

(i) Growth of shoots **(2 marks)**

(ii) Growth of the roots (2 marks)

(c) Estimate the mean root and the mean shoot lengths when the concentration of sulphuric acid is 5×10^{-3} **(2 marks)**

(d) State **two** other effects of acid rain. **(2 marks)**

(e) State **three** ways of preventing acid rain. **(3 marks)**

(f) Name two other gases with the same effect Sulphur (IV) oxide gas in the atmosphere. **(2 marks)**

7. a) Describe the mechanism of inhalation and exhalation in mammals **(14marks)**

b). Explain **three** factors that affect rate of breathing **(6marks)**

8. a) Describe the process of double fertilization in flowering plants. **(15marks)**

b) Describe what happens to the various parts of a flower after fertilization. **(5 marks)**

PAPER 3

1. You are provided with a specimen labelled **Q**, use it to answer the questions that follow.

(a) (i) Sketch a drawing and label the specimen on the space provided. **(2 marks)**

(iii) Make a transverse section of the specimen and label. **(3 marks)**

(b) What type of fruit is specimen Q? **(1 mark)**

c) Slice off about 2cm^{2}cube from the specimen. Peel it. Tie one end of the 8cm LONG transparent visking tubing provided. Place the banana cube and tie the other end to ENSURE THERE IS NO LEAKAGE AND BOTH ENDS OF THE TUBING.
Rinse the outside of the tubing with water. Immerse the tubing with its content in 100ml beaker containing iodine solution. Allow standing for 20 minutes.

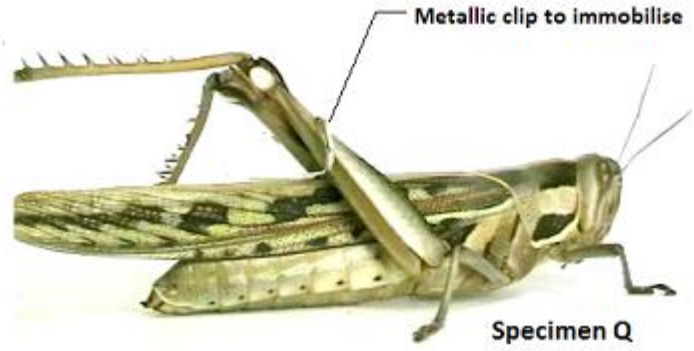
(i) Record your observations in the table below. **(4 marks)**

	Contents inside tubing	Iodine solution Outside tubing
Before the experiment		
After the experiment		

(ii) What was the physiological activity under test? **(1 mark)**

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

2. You are provided with specimen **Q, R S T** and **U**. Study them to answer the questions below.



Specimen Q


R


S


T


U

(a) Work the actual length of specimen **T,** given that the shatter resistant ruler measures **Q** from tip of mouth to tip of abdomen. **(3 marks)**

(b) Aboy immobilised specimen **Q** and attempted to drawn and suffocate it in water by placing its head in water. Using observable features, explain why he couldn't succeed. **(2 marks)**

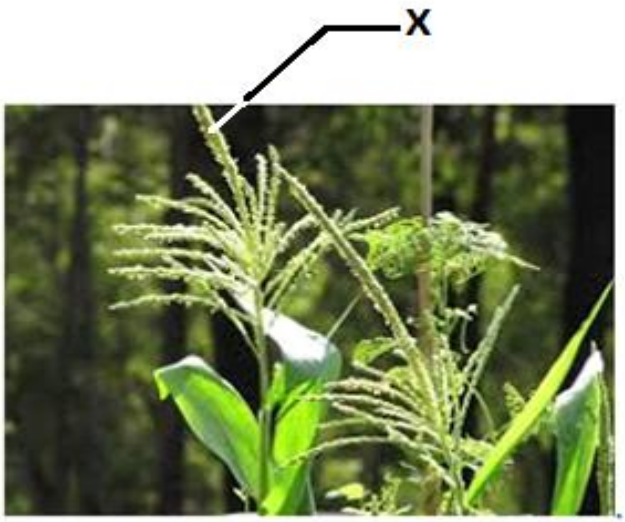
(c)Use the features in order given below and construct a dichotomous key that can be used to identify the specimen above.

Wings, long or short hind limbs, number of legs, antenna. **(8 marks)**

(d) State three ways in which specimen **Q** is adapted to evade its predators in its ecological niche. **(3 marks)**

3. You are provided with two photographs below of maize plant (*Zea mays*) taken from the school farm.Use them to answer the questions that follow.

photograph A



photograph B

(a) Classify the specimen into Division, Sub-division and Class where it belongs.

Division **(1 mark)**
Sub-division **(1 mark)**
Class **(1 mark)**

b) Give **one** reason why you classified it into sub- division above. **(1 mark)**

(i) What type of leaf arrangement is shown in photograph **A** above. **(1 mark)**

(ii) Giving reasons, give the **term** used to describe the above flower based on the agent of pollination. **(1 mark)**

Reasons (2 marks)

iii) On the photographs, label where the pollen grain produced and where stigma is likely to be found respectively. **(2 marks)**

iv) With respect to floral arrangement, what term is used to describe maize plant? **(1 mark)**

KCSE PREDICTION 5 2022

PAPER 1

1. (a) What is meant by the term binomial nomenclature? **1mark)**

(b) Give **two** reasons why classification is important **(2 marks)**

2. (a) What is the formula for calculating linear magnification of a specimen when using a hand lens**?** **(1mark)**

(b) Give a reason why staining is necessary when preparing specimens for observation under the microscope **(1 mark)**

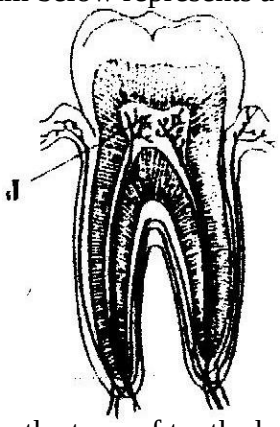
3. Plant cells do not burst when immersed in distilled water. Explain **(2marks)**

4. State **three** functions of Golgi apparatus**.** **(3 marks)**

5. Distinguish between diffusion and osmosis. **(2 marks)**

6. Describe what happens during the light stage of photosynthesis. **(3 marks)**

7. The diagram below represents a section though a human tooth



(a) (i) Name the type of tooth shown **(1 mark)**

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

(b) State the functions of the structures found in part labeled J **(2 marks)**

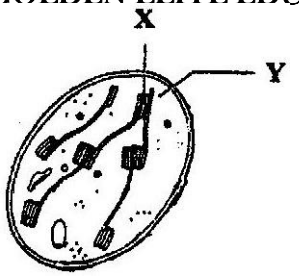
8. (a) Name a fat soluble vitamin manufactured by the human body. **(1 mark)**

(b) State **two** functions of potassium in the human body **. (2 marks)**

9. State **two** ways in which the root hairs are adapted to their function**.** **(2 marks)**

10. a) State the functions of cristae in mitochondria**.** **(1mark)**

b) The diagram below represents a cell organelle.



(i) Name the part labeled Y. **(1mark)**

(ii) State the functions of the part labeled X. **(1mark)**

11. Name the part of the flower that develops into **(2marks)**

a)Seed……

b)Fruit……

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

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

13. State **two** ways in which floating leaves of aquatic plants are adapted to gaseous exchange. **(2marks)**

14. a) State **three** characteristics of Monera that are not found in other kingdoms. **(3marks)**

b) Name the class to which a termite belongs **(1mark)**

15. a) Name **one** defect of circulatory system in humans. **(1mark)**

b) State **three** functions of blood other than transport. **(3marks)**

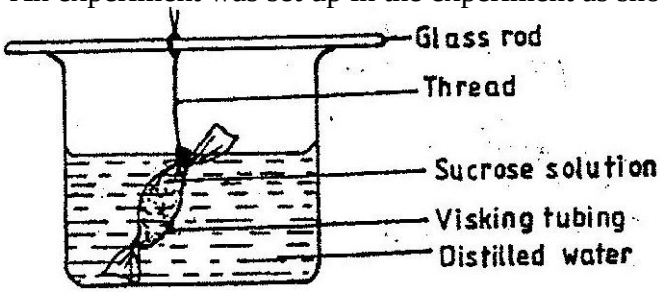
16. State the role of vitamin C in humans. **(1mark)**

17. a) State **two** processes which occur during anaphase of mitosis**.** **(2marks)**

b) What is significance of meiosis? **(2marks)**

18. State the role of insulin in human body. **(1marks)**

19. An experiment was set up in the experiment as show below.



The set up was left for 30 minutes.

a) State the expected results. **(1mark)**

b) Explain your answer in (a) above **(3marks)**

20. a)In what form is energy stored in muscles **(1mark)**

b) State the economic importance of anaerobic respiration in plants**.** **(2marks)**

21. a) Distinguish between epigeal and hypogeal germination. **(2marks)**

b) Why is oxygen necessary in the germination of seeds? **(2marks)**

22. (a)What prevents blood in veins from flowing backwards? **(1 mark)**

(b) State **two** ways in which the red blood cells are adapted to their function **(2 marks)**

23. What is the importance of the following in an ecosystem? **(2marks)**

a) Decomposers

b) Predation

24. a) Distinguish between the terms homodont and heterodont. **(1mark)**

b) What is the function of carnassials teeth? **(1mark)**

c) A certain animal has no incisors, no canines, 6 premolars and 6 Molars in its upper jaw. In the lower jaw there are 6 incisors, 2 canines, 6Premolars and six molars. Write its dental formula. **(2marks)**

25. a) State **two** functions of bile juice in the digestion of food. **(2marks)**

b) How does substrate concentration affect the rate of enzyme action? **(1mark)**

26. a) Explain how the following prevent self-pollination. **(2marks)**

(i) Protandry

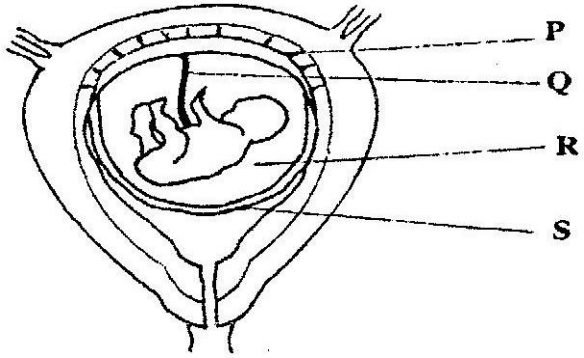
(ii) Self – sterility.

b) Give **three** advantages of cross pollination. **(3marks)**

27. State **four** ways in which respiratory surfaces are suited to their function**.** **(4marks)**

PAPER 2

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



a) Name the part labeled S. **(1 mark)**

b) i) Name the types of blood vessels found in the structure labeled Q. **(2marks)**

ii) State the differences in composition of blood found in the vessels named in (b) (i) above**.** **(2marks)**

c) Name two features that enable the structure labeled P carry out its function**.** **(2marks)**

d) State the role of the part labeled R. **(1mark)**

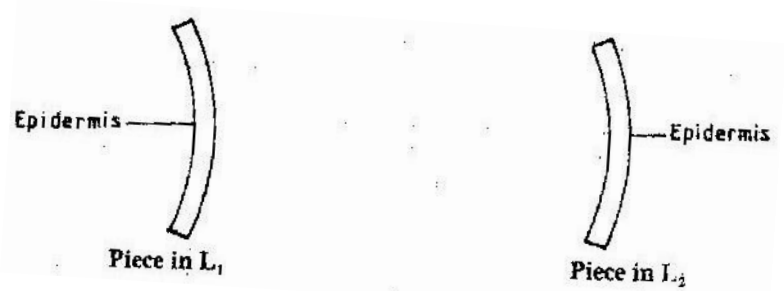
2. (a) Explain what happens to excess amino- acids in the liver of humans. **(3 marks)**

(b) Which portions of the human nephron are only found in the cortex? **(3 marks)**

(c) (i) What would happen if a person produced less ant -diuretic hormone? **(1 mark)**

(ii) What term is given to the condition described in (c) (i) above **(1 mark)**

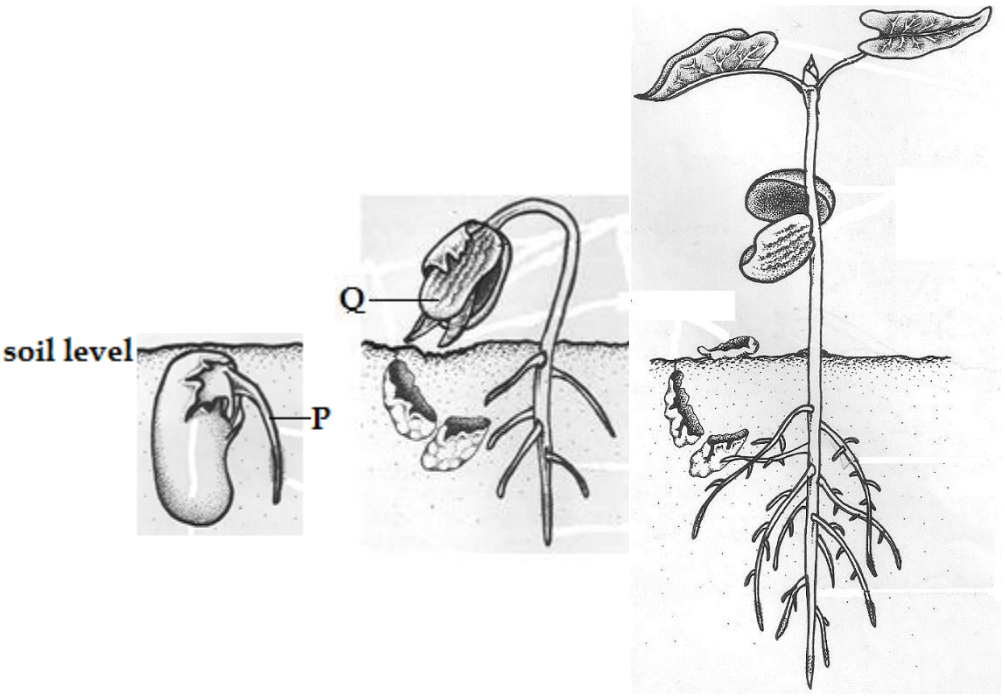
3. A freshly obtained dandelion stem measuring 5 cm long was split lengthwise to obtain two similar pieces. The pieces were placed in solutions of different concentrations in Petri dishes for 20 minutes. The appearance after 20 minutes is as shown



a) Account for the appearance of the pieces in solutions L_1 and L2. **(6 marks)**

b) State the significance of the biological process involved in the experiment**.** **(2 marks)**

c) The diagrams below illustrate germination in *Phaseolus vulgaris*. Study the diagrams and answer the questions that follow



(a) Identify the parts labeled **P** and **Q** **(2 marks)**

(b) **(i)** Using observable features identify the taxonomic class of *Phaseolus vulgaris* **(1 mark)**

(ii) Give **two** reasons for your answer in **(i)** above **(2 marks)**

(c) **(i)** What type of germination is this? **(1 mark)**

(ii) Explain how the type of germination in **(i)** above occurs **(2 marks)**

5 **(i)** Colour blindness is rare in women. However when a woman has normal colour vision but is a carrier for this trait marries a colour blind man, a colour blind daughter may be born to them. Show how this is possible. **(4 marks)**

(ii) Give **two** examples of disorders caused by mutant gene located in the chromosomes. **(2 marks)**

(iii) What do you understand by the term linked genes **(2marks)**

SECTION B (40 MKS)

Answer questions 6(compulsory) and either questions 7 or 8

6. In an experiment to determine the effect of exercise on the concentration of lactic acid in blood, the following data was obtained. Study the data and use it to answer the questions that follow. The lactic acid concentration was measured before, during and after the exercise.

Time minutes	0	10	20	25	30	40	50	60	70	80	90	100
Lactic acid conc. (arbitrary units)	0.5	0.5	5	13	12	8	6	4	3	2	1	0.9

(a) Using a suitable scale, plot a graph of the concentration of lactic acid against time. **(6marks)**

minutes. **(2marks)**

(d) Why does lactic acid level usually continue to rise in the blood after exercise ceases. **(2marks)**

(e) Suggest the **two** importance of anaerobic respiration to animals. **(2marks)**
(d) What is oxygen debt? **(2marks)**
7. Describe the route taken by water from the soil up to the evaporating surface of a plant. **(20 marks)**
8. Explain how the various abiotic factors may affect plants. **(20 marks)**

KCSE PREDICTION 6 2022
PAPER 1

1.State two features of leaves which enable a plant to reduce the loss of water. (2mk)

2.a) State the Phylum where all members have open circulatory system. (1mk)

b) Explain two advantages of closed circulatory system over open circulatory system. (2mk)

3. a) Under which of the following magnifications would one see a larger part of the specimen X 40 or X500? Give a reason. (2 Marks)

(b) State how magnification is worked out in a light microscope. (1 Mark)

4.Name two components of blood that are not present in glomerular filtrate. (2mks)

5.The following is an equation representing a type of respiration

$$C_6H_{12}O_6 \longrightarrow 2C_3H_6O_3 + \text{Energy}$$

a) Identify the type of respiration. (1mk)
b) Suggest one industrial application of the process named in (a) above. (1mk)

6a) What is meant by the term binomial nomenclature. (1mk)

b) A dog is called Canis familiairis. Name the taxonomic unit represented by canis.(1mk)

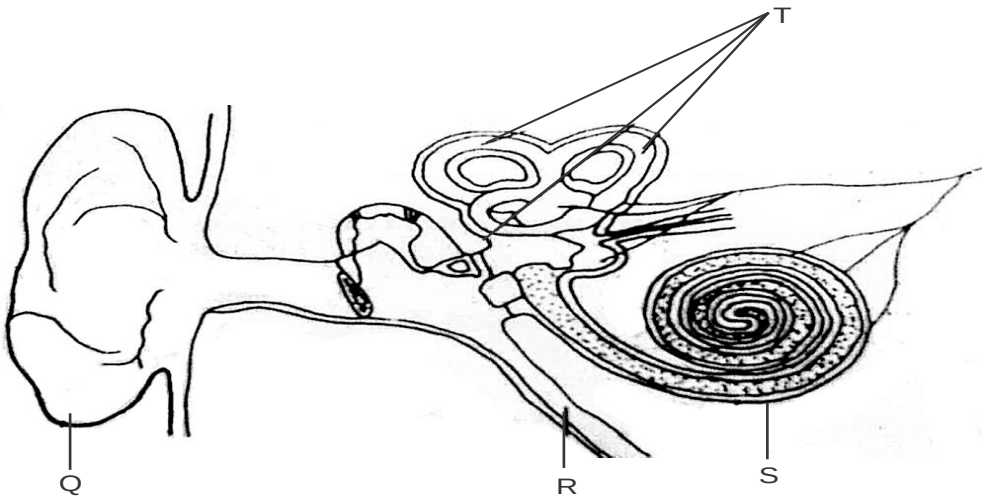
7.Give two functions of the exoskeleton in arthropods. (2mks)

8. The colour of tips of hair in Shepherd dog is controlled by a gene with three alleles B for Black, R for red and C for copper. A cross between pure breeding red and copper hair tips produce offsprings with scarlet hair tips. Crossing pure breeding red and black hair tips yields all red offsprings. A cross between pure breeds of copper and black produce offsprings that are all copper.
a) Comment on the inheritance of the three alleles B, R and C. (2 marks)
b) A dog breeder wishes to know the genotype of a dog with red hair tips. State and explain the cross needed to determine the dog's genotype. (2 marks)

9. What is the importance of seed dispersal? (3mks)

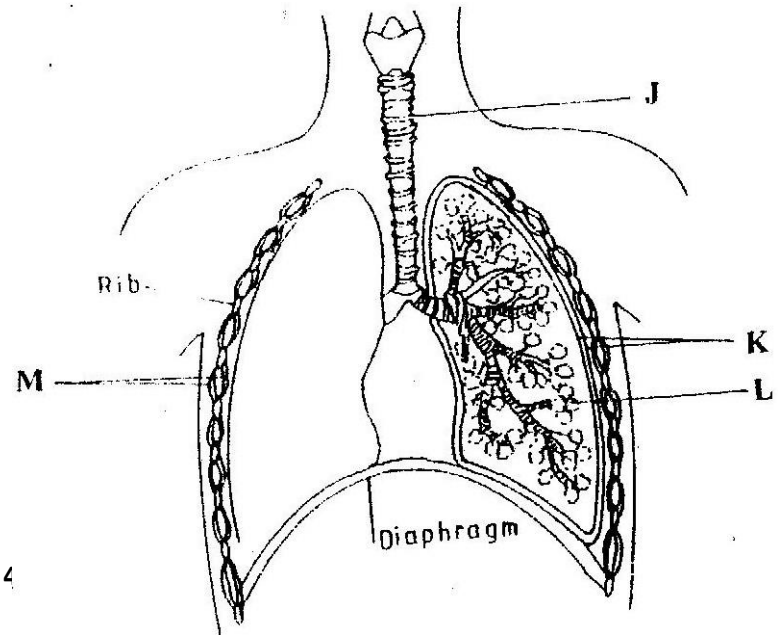
10. State two adaptations of guard cells to its function. (2Marks)

11. Describe the censor mechanism of seed dispersal. (2mks)
12. Explain "struggle for existence" and "survival of the fittest" as they apply to natural Selection. (4mks)
    Struggle for existence
    Survival of the fittest:-
13. (a) Define the following term
    Incomplete metamorphosis. (1mk)
    (b) State one function of each of the following hormones (2mks)
    (i) Juvenile hormone.
    (ii) Ecdysone.
14. a) Name the organelle where the cell wall components are synthesized. (1mk)
    b) State two roles of cell wall to a plant. (2mks)
15. The diagram below represents a section through the mammalian ear.



a) Name the structures labelled R and T. (2 mark)
b) State how the structures Q and S are adapted to their functions. (2 mark)

16. The diagram below represents some gaseous exchange structures in humans



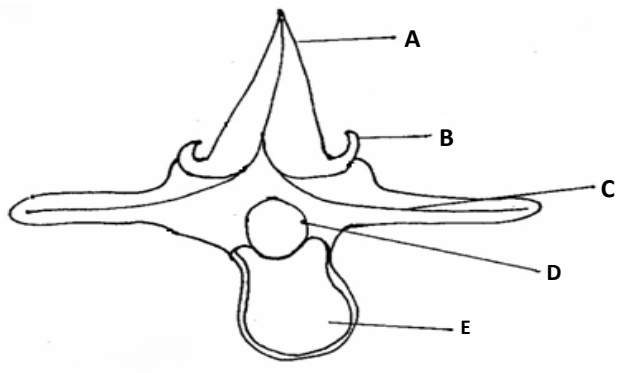
(a) Name the structures labeled K (1 marks)

(b) state two way in which the structure labeled J is suited to its function? (2 marks)

(c) Name the process by which inhaled air moves from the structure labeled **L** into blood capillaries (1 mark)

(d) Give the scientific name of the organism that causes tuberculosis in humans(1 mark)

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



(a) With a reason, identify the type of vertebra shown above. (1mks)

b) Name the parts labeled.

(i) A (1mk)

(ii) D (1mk)

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

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

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

20.The following are events suggested by the theory of natural selection.

i. Reproduction of organism with favorable variation
ii. The emergence of new species
iii. Variation between individuals
iv. A struggle for existence
v. The survival to the fittest

a) Who postulated the theory of natural selection? (1 mark)

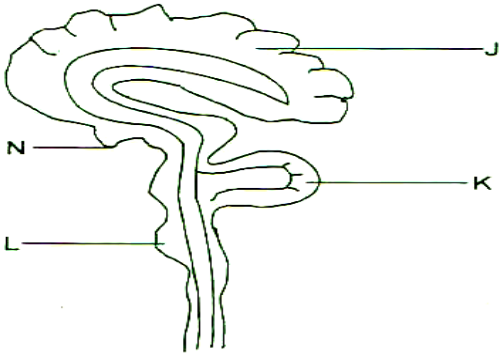
b) What is meant by natural selection? (1 mark)

c) Arrange in an order that best illustrate the sequence of events leading to evolution by natural selection

d)

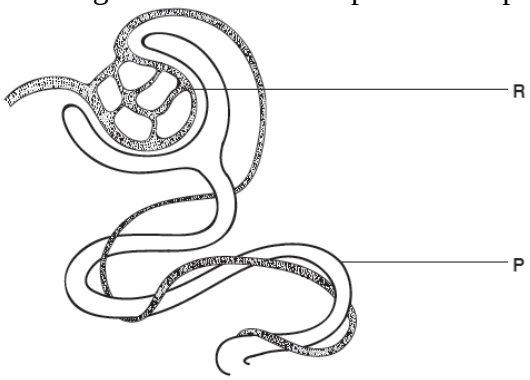
(1 mark)

21.The diagram below shows a vertical section through human brain.



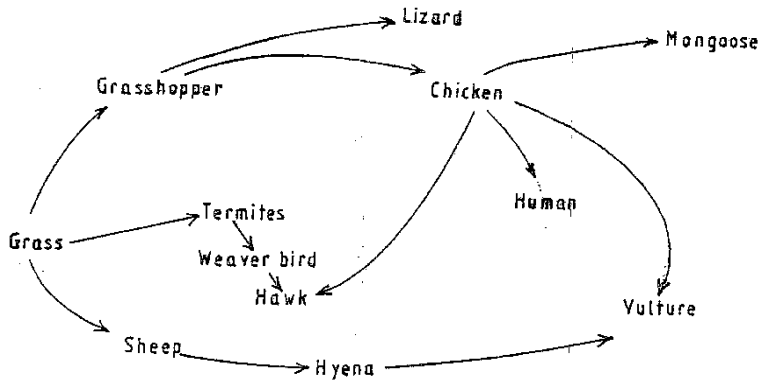
a) Name the part labeled K (1 mark)
b) State why the part labeled J is large and highly folded. (1 mark)
c) Give a letter on the diagram which:
i. Serve as endocrine gland (1 mark)
ii. Control breathing, swallowing and blood circulation (1 mark)

22. The diagram below shows part of a nephron from the human kidney.



(a) (i) Name the structure labelled **R**. (1 mark)
(ii) Name the process carried out at **P** (1 mark)
(b) The hormone ADH affects water reabsorption from the nephron.
(i) Which part of the brain releases ADH? (1 mark)
(ii) Name a part of the nephron where water is reabsorbed. (1 mark)

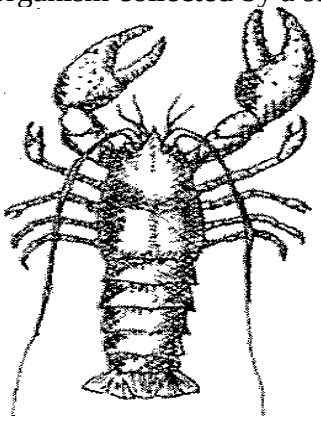
23.The figure below illustrates a food web in a certain ecosystem.



From the food web:

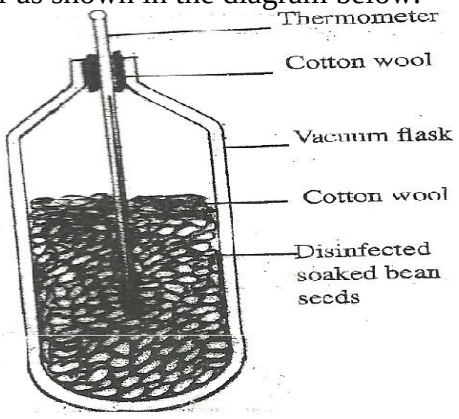
(a) Draw the shortest food chain; (1mk)
(b) identify the organisms with the highest
(i) Number of predators (1mk)
(ii) Biomass (1mk)

24.The diagram below represents a certain organism collected by a student at the sea shore.



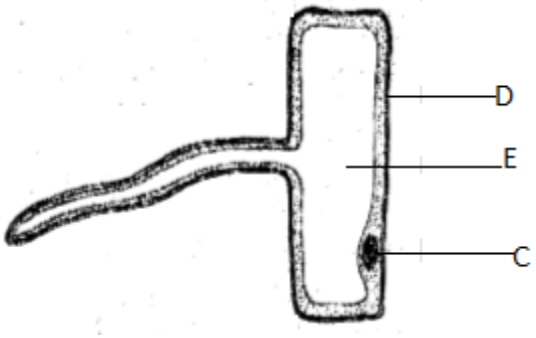
(a) Name the class to which the organism belongs. (1mk)
(b) Give three reasons for your answer in (a) above. (3mks) -

25.In an experiment, disinfection soaked bean seeds were put in a vacuum flask which was then fitted with a thermometer as shown in the diagram below.



The temperature readings were taken every morning for three consecutive days.
a) Which process was being investigated? (1 mark)
b) i) what were the expected results? (1 mark)
ii) Account for the answer in (b) (i) above? (2 marks)

26. The diagram below shows a specialized plant cell



(a) i) name the cell (1mk)

ii) name the cell parts labeled D and E (2mk)

b) state the functions of the part labelled C (1mk)

PAPER 2

SECTION A

1. An investigation was carried out to study the effects of the concentration of sucrose solutions on pieces of tulip stem 44mm in length. The pieces were placed in different concentrations of sucrose solutions and measured after two hours of immersion. The results are shown in the table below.

Sucrose concentration (moles per litre)	0.2	0.3	0.4	0.5	0.6	0.7	0.8
Length after 2 hours (mm)	50	48	46	44	42	42	42

a. Explain the effect of the 0.2 moles per litre sucrose solution on the length of the pieces of the tulip stem.
(3mks).

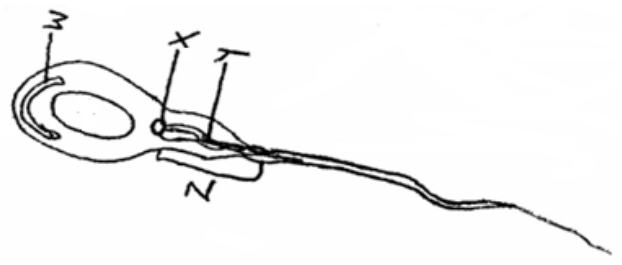
b. Use information from the table to predict the concentration of a sucrose solution isotonic to the cells in the tulip stem. (1mk).

(i) Give the term which would be used to describe the cells in the tulip stem after immersion in a solution with a sucrose concentration of 0.7 moles per litre.(1mk)

ii. Draw the appearance of a cell from the tulip stem after immersion in a solution with a sucrose concentration of 0.7 moles per litre. (2mks).

State one role of the process being investigated in plants.
(1mk)

2. Below is a diagram of a sperm cell.



(a) Identify parts labeled **X** and **Y**. (2 marks)

X

Y

(b) Explain how parts **W** and **Z** adapt the cell to its function. (4 marks)

W

Z

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

(d) State the function of part **X**. (1 mark)

3. Polydactyl is a genetic disorder in which people inherit an extra digit. Polydactyl is caused by a dominant allele (B). The table below describes the different genotypes for polydactyl.

a) Complete the table below by giving the correct genotype, alleles of each genotype and the expected number of fingers per hand. (4mks)

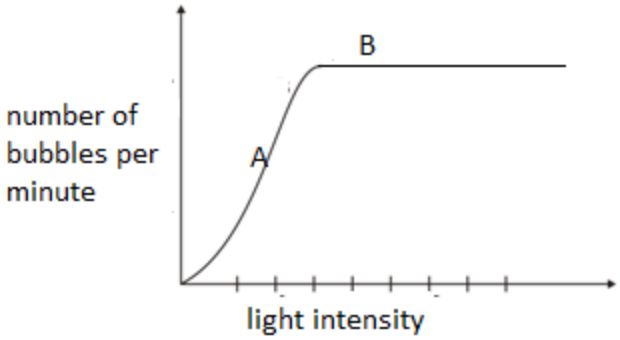
Genotype	Alleles	Expected number of digits per hand.
Homozygous dominant		Six
	bb	
Heterozygous.	Bb	

b) The table below shows results of marriages between various parents. Complete the table by writing the probability of each marriage producing a child with polydactyl. One has been done for you. (2mks)

Parental genotypes.	Probability of child with polydactyl
Bb X BB	
Bb X bb	0.5
Bb X Bb	

c) State the two types of variation (2mks)

3. Cuban pond weed (*Elodea cubiensis*) is a common water plant that produces tiny air bubbles of oxygen during photosynthesis. The number of bubbles produced per minute indicates the rate of photosynthesis. The graph shows how the rate of photosynthesis in the pond weed relates to light intensity.



a). write the equation to account for the air bubbles. (1mk)

b). Name the factor that affects photosynthesis at point A. Explain. (2mks)

c). Explain why the rate of photosynthesis does not increase any further at high light intensity.(point B) (2mks)

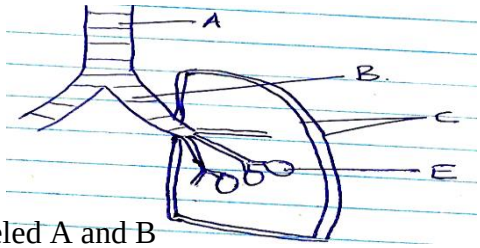
d). Explain the role of the following in photosynthesis.

i) Chlorophyll. (1mk)

ii) Water. (1mk)

e). Name one product of the light stage of photosynthesis used in the dark stage of photosynthesis. (1mk)

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



a) Name the part labeled A and B (2marks)
b) State the function of the part labeled C (2marks)

c) How is he part labeled E adapted to its function (2marks)

d) Identify the structure that perform the same function as one illustrated above in (2marks)
i) Amoeba

ii) Fish

SECTION B (40 Marks)

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

6. In an ecological study a certain insect population and that of predators was estimated in a certain grassland over a period of one year.

Month	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec
No of insects	10	20	16	24	50	85	45	18	12	30	48	70
No of predator	10	12	8	10	16	30	10	4	2	2	5	20
Rainfall amount(mm)	20	6	55	350	500	250	12	10	25	190	240	30

a) Using the information above plot on the same axis the graph of number of insects and number of predators against time in months. (7mks)

b) Suggest what happens to the insect's population during dry month. (2mks)
c) Explain the relationship between the insect population and that of the predators. (3mks)
d) Suggest what happens to the predator's population during the dry month. (2mks)
e) Name the trophic level occupied by (3mks)
i) Predator.
ii) Insect.
iii) Grass.
f) Name the method used to estimate population of (3mks)
i). Predator.
Insect.
ii. Grass.

7. State and explain various areas where knowledge about genetics is applied. (20mks)

8. a) Describe the process of fertilization in flowering plant. (15mks)
b) State the changes that take place in a flower after fertilization. (5mks)

PAPER 3

1. You are provided with powder Q and powder R. Measure 10ml of distilled water and put it in a boiling tube. Put powder Q in the boiling tube, shake and make a solution. Label it solution Q. Measure 10ml of distilled water and put it in another boiling tube. Put powder R in the boiling tube, shake and make a solution. Label it solution R.

a) Using the reagents provided carryout food tests on the two solutions to determine the food present in the two solutions. (8mks)

Solution	Food	Procedure	Observation	Conclusion
Q				
R				

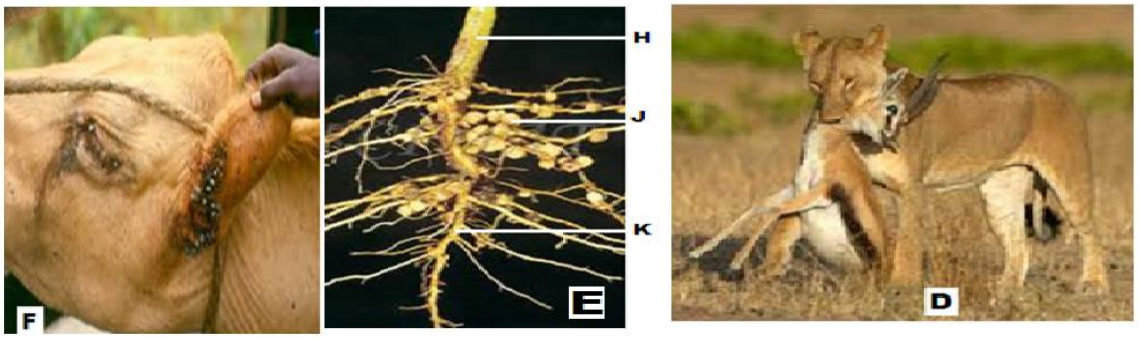
b (i). Which of the two food substances should be included in a diet to protect a child suffering from kwashiorkor? (1mk)

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

C (i) Name two enzymes in the human body which digest the food substances found in the powder. (2mks)

ii) State the organ from which each enzyme you have stated in c (i) acts. (2mks)

Observe the three photographs carefully and answer the questions that follow



a) Identify the structures labeled H, J, and K (3mks)

b) Suggest the group of plant from which the root is obtained (1mk)

c) Explain the relationship found at point J (4mks)

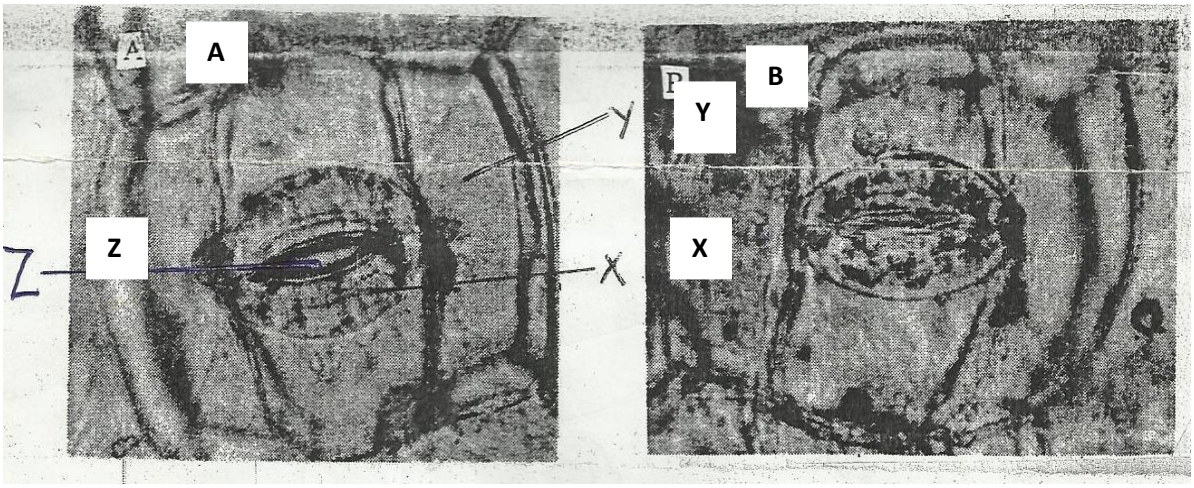
d) Explain how the relationship benefits a farmer. (2mks)

e) State one difference between the relationships in photographs D and F. (1mk)

f) Construct one food chain from the organisms in photograph D (1mk)

g) State two disadvantages of the relationship shown in photograph F (2mks)

2. The photographs below show a certain physiological process.



a) Name the physiological process shown by the photographs. (1Mark)

Name cells X and Y. (2Marks)

b) How is cell X adapted to function? (2Marks)

i) Name **two** substances that passes through part Z. (2Marks)

ii) Describe the significance of the process shown by figure A. (2Marks)

c) State three theories that explain the appearance of figure A and B. (3Marks)

KCSE PREDICTION 7 2022

PAPER 1

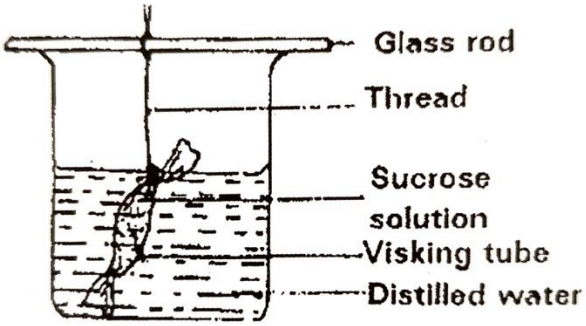
1. State the significance of the following characteristics of living organisms. (2marks)

   (i) Irritability
   (ii) Reproduction

2. The scientific name ***lantana camara*** refers to a green herbaceous plant. Other related plants include ***lantana trifoliate*** and ***vitex trifoliate.*** From the list, identify the plants belonging to the same genus. (2marks)

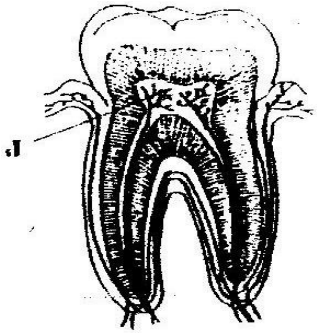
3. Which cell organelle will be abundant in: (2marks)
   (i) Skeletal muscle cell
   (ii) Palisade cell

4. An experiment was set up as shown below. The set up was left for 30 minutes.



(i) State the observations made after 30 minutes. (1mark)
(ii) Explain the observations made in (i) above. (3marks)

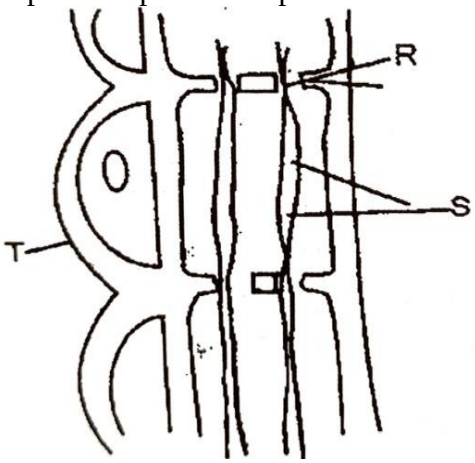
5. The diagram below represents a section though a human tooth



a) (i) Name the type of tooth shown (1 mark)
(ii) Give a reason for your answer in (a) (i) above (1 mark)
b) State the functions of the structures found in part labeled **J** (2 marks)

6. Describe what happens during the light stage of photosynthesis (3 marks)

7. The diagram below represents part of the phloem tissue.



a) Name the structures labeled **R, S** and a cell labeled **T**(3amrks)
b) State the function of the structure labeled **S**. (1mark)

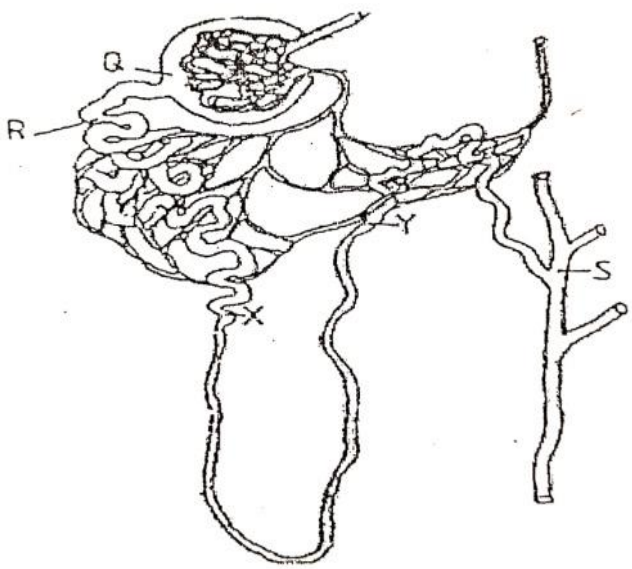
8. a) What prevents blood in veins from flowing backwards? (1mark)
b) State two ways in which the red blood cells are adapted to their functions. (2marks)

9. Differentiate between Active immunity and Passive immunity. (2marks)

10. State three gaseous exchange structures in terrestrial plants. (3marks)

11. Give two reasons why accumulation of lactic acid during vigorous exercise leads to an increase in heart beat. (2marks)

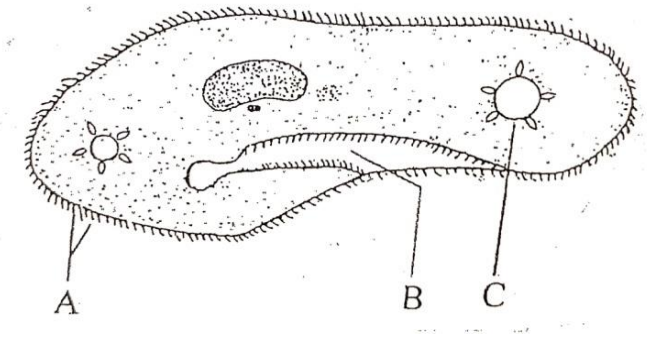
12. The diagram below illustrates part of a Nephron from a mammalian kidney.



a) Name the fluid in the part labeled **Q** (1mark)
b) Identify the process responsible for the formation of the fluid named in (a) above. (1mark)
c) Which two hormones exert their effects in the Nephron? (2marks)

13. Give one economic importance of the following plant excretory product. (1mark)
(i) Tannins

14. The diagram below represents a living organism.

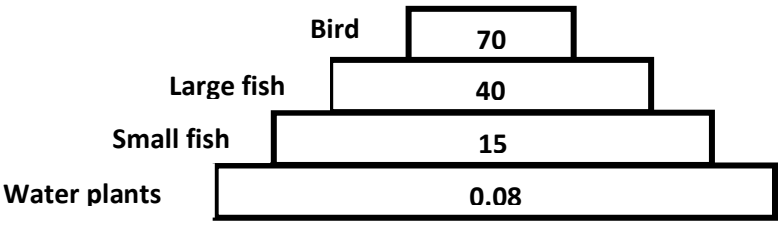


a) Name the structures labeled **A** and **C** (2marks)
b) Identify the kingdom of the above organism. (1mark)
c) Give a reason for your answer in **(b)** above (1mark)

15. Name the phylum, whose members posses a notochord. (1mark)

16. Define the following terms: - (3marks)
(i) Ecological niche
(ii) Habitat
(iii) Carrying capacity

17. The figure below shows the amount of **DDT** at different levels in a food chain in a lake.

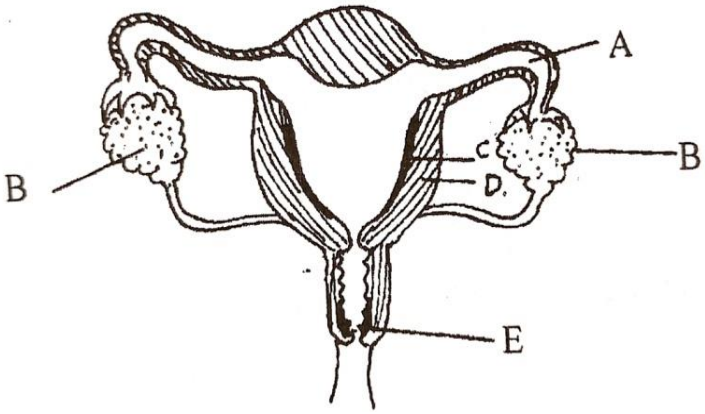


a) At what trophic level is **DDT** most likely to have the highest marked effect? (1mark)

b) Suggest two ways in which the birds might have come into contact with **DDT** (2marks)

c) Extract and write down a food chain from the above figure. (1mark)

18. Study the diagram below and use it to answer the questions that follow:



a) Name the part labeled E (1mark)

b) What are the functions of the part labeled **A**? (2marks)

19. Explain how the following factors hinder self-pollination in plants. (2marks)

(i) Protogyny

(ii) Dioecism

20. a) Name the part of the flower that develops into each of the following (2marks)

(i) Seed coat.

(ii) Seed

b) State two environmental conditions that can cause seed dormancy (2marks)

c) State two ways of breaking seed dormancy (2marks)

d) Give one role of water in germination(1mark)

21. Define the following terms as used in genetics. (3marks)

(i) Alleles

(ii) Gene mutation

(iii) Discontinuous variation

22. State two sex-linked traits located on the **Y**- chromosome (2marks)

23. State three limitations of using fossil records as an evidence for organic evolution (3marks)

24. State three types of neurons (3marks)

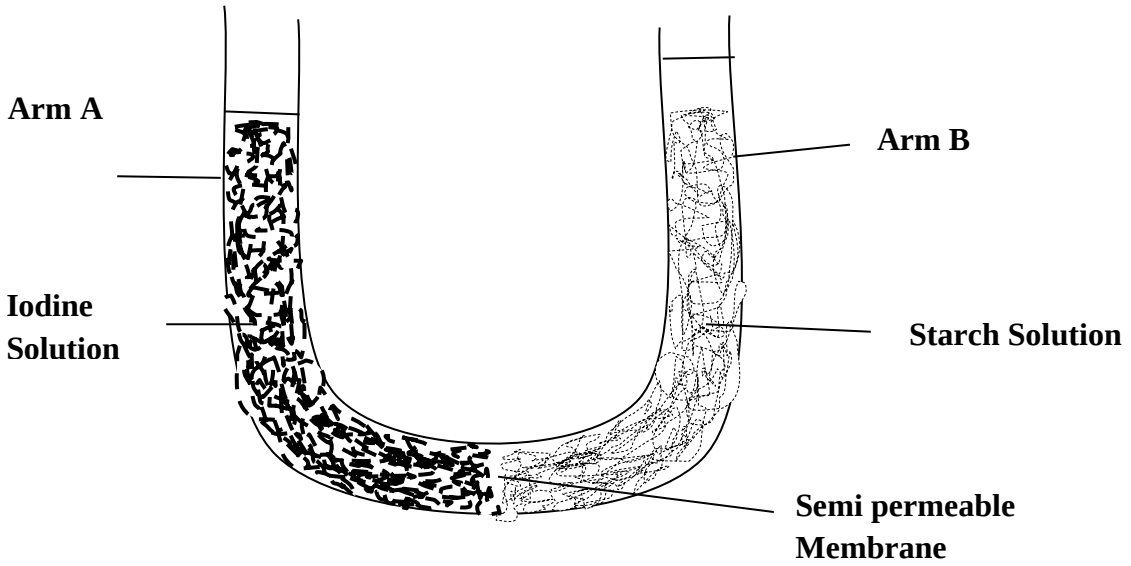
25. Define the following types of responses (3marks)
    (i) Phototropism
    (ii) Chemotaxis
    (iii) Thigmotropism
26. Differentiate between **support** and **movement** (2marks)

PAPER 2

SECTION A. (40 MARKS)

Answer all questions in this section in the spaces provided.

1. The set up below show an experiment in which iodine solution and starch were separated by a semi permeable membrane.



(a) Name the process that is being investigated. (1mk)
(b) (i) State the observations made in the two arms of the U-tube. (2mks)
Arm A
Arm B
(ii) Account for your answer in (i) above. (2mks)
(c) (i) State two applications of the process in (a) above in animals. (2mks)
(ii) Name one factor that will affect the process named in (a) above. (1mk)

2. (a) (i) Name the components of blood that are absent in the glomerula filtrate. (2mks)
(ii) Give a reason for your answer above. (1mk)
(b) (i) What would happen if a person produced less antidiuretic hormone. (1mk)
(ii) Name the disease described in b (i) above? (1mk)
(c) Explain what happens to excess amino acids in the liver of humans. (3mks)

3. (a) (i) Premature baldness in a sex linked trait. A bald headed man marries a woman. Work out the genotype of the off springs. Use letter B to represent the gene for bald head. (4mks)
(ii) What is the probability that their daughter will have premature baldness? (1mk)
(iii) Give a reason for the answer in 3 (ii) above. (1mk)
(b) The diagram below show the template strand of a Deoxyribonucleic acid molecule.

A	G	T	A	T	C	G

(i) Draw a diagram to represent a complimentary RNA strand. (1mk)

(ii) State one advantage of polyploidy in plants. (1mk)

4. The table below shows some of the components found in 100cm^3 of cow's milk, breast milk and breast milk substitute (formula milk).

component	cow's milk	Breast milk	breast milk substitute
Protein/g	3.3.	1.2	1.3
Sugar/g	4.2	6.4	7.0
Fat/g	3.0	4.0	1.4
Calcium /mg	120.0	120.0	49.0
Iron/mg	0.1	0.1	0.5
vitamin C/mg	1.0	2.0	8.3
Vitamin D/µg	20.0	200.0	1.2

(a) Name two main components of a normal healthy diet that do not appear in the table.(2mks)

(b) State which type of milk would be least likely to ensure the development of healthy bones and teeth, and explain your answer? (2mks)

Type of milk ……

Explanation……

State which type of milk would provide a baby with the greatest amount of energy? Give your reasons (2mks)

Type of milk ……

Reasons……

(c) Suggest why babies fed on breast milk may have more resistance to diseases than those fed on any other type of milk. (2mks)

5. (a) What is the difference between Darwinian and Lamackian theories of evolution? (2mks)

(b) What is meant by the following terms? Give an example in each case.

(i) Homologous (1mk)

Example (1mk)

(ii) Analogous (1mk)

Example (1mk)

(iii)Vestigial Structures (1mk)

Example (1mk)

SECTION B

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

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

Time in days	Oestrogen mg/100cm^3	progesterone mg/100cm^3 of blood	Temperature in 0^{o}C
1	20	0	36.4
3	25	0	36.7
5	30	0	36.7
7	35	0	36.8
9	48	0	36.6
11	64	0	36.7

13	80	0	36.4
15	140	50	36.6
17	70	130	37.2
19	60	160	37.1
21	130	130	37.2
23	130	90	37.0
25	80	50	37.2
27	20	0	36.4

(a) Using the same axes draw graphs of oestrogen and progesterone against time. (8mks)
(b) State the possible event taking place in the uterus during the first week. (1mk)
(c) State the events taking place in the ovary between day 1 and day 13. (2mks)
(d) Account for the sudden increase in the progesterone concentration between day 14 and day 18. (2mks)
(e) Account for the change in temperature between day 14 and 17. (1mk)
(f) Account for the change of the curve of progesterone between day 19 and 27. (2mks)
(g) State the function of the following:
(i) Testes. (2mks)
(ii) Sertoli cells (1mk)

7. (a) State four industrial applications of anaerobic respiration. (4mks)
(b) Describe the mechanism of gaseous exchange in humans. (16mks)
8. (a) Describe biological nitrogen fixation in leguminous plants. (5mks)
(b) Explain how abiotic factors affect plants. (15mks)

PAPER 3

1. Using the piece of string provided, tie the visking tubing tightly at one end. Put 2cm of solution P into the visking tubing using a dropper to avoid spilling. Then tightly tie the other end and place it in a boiling tube containing 2cm^3 of iodine solution.

a) (i) Leave it for 5 minutes then record your results below. (I mark)
(ii) Account for your results answer in a (i) above. (2 marks)

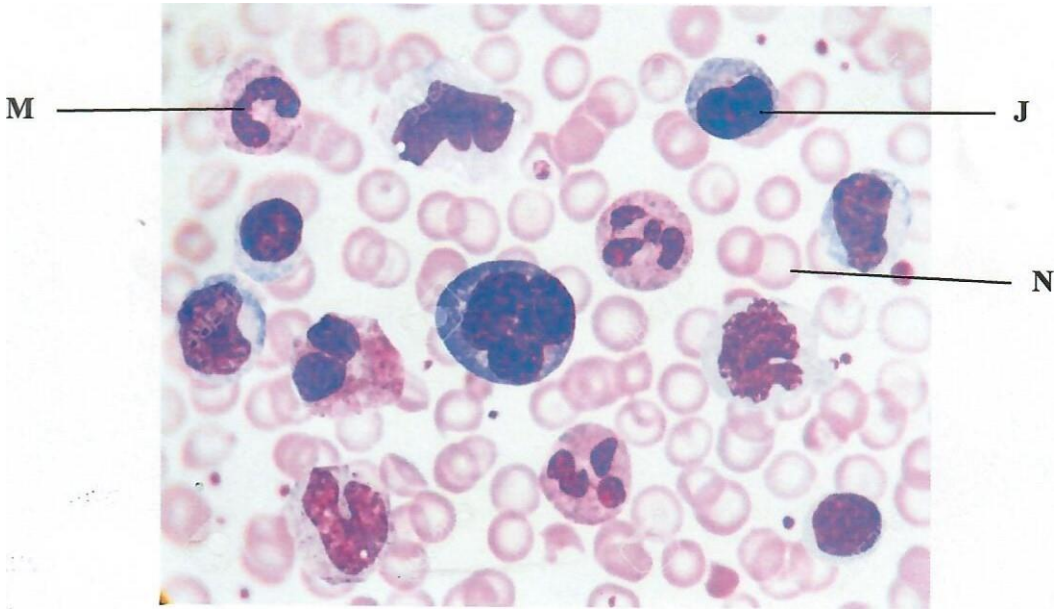
b) (i) Make a transverse section of specimen D provided and made a labeled drawing.(3 marks)
(ii) Cut a strip of4cm long by 2cm wide from the banana peel (of specimen D) and place on a petri dish containing solution L. Record your observation after 10 minutes in the table below. (2 marks)

	Length at start of experiment	Length at end of experiment
Strip of banana peel		

(iii) Account for your answer in b(ii) above. (3 marks)

c) State the role of the process under investigation in organisms in la) (i) and in 1b) (ii) above.(3 marks)
Process in 1 a) (i) (1 mark)
Process in 1 b) (ii) (1 mark)

2. Below is a photomicrograph of blood smear showing several elements.



a) On it label any four elements of blood (4 marks)

b) Briefly explain the mode of action of elements M and J (2 marks)

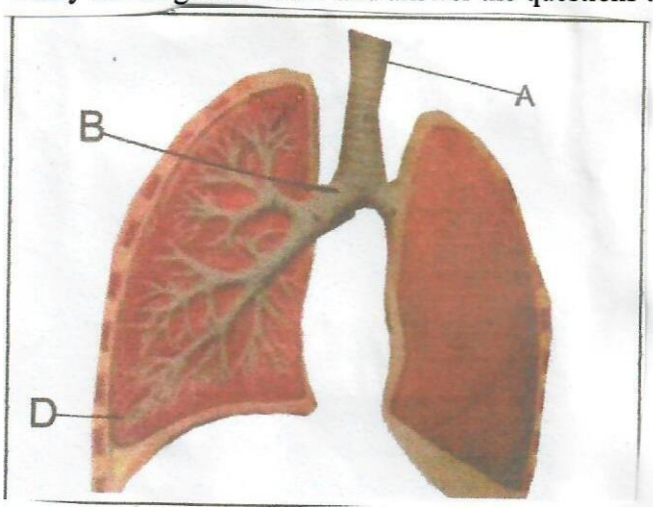
c) What are the effects of high attitude on the numbers of element N.? (1 mark)

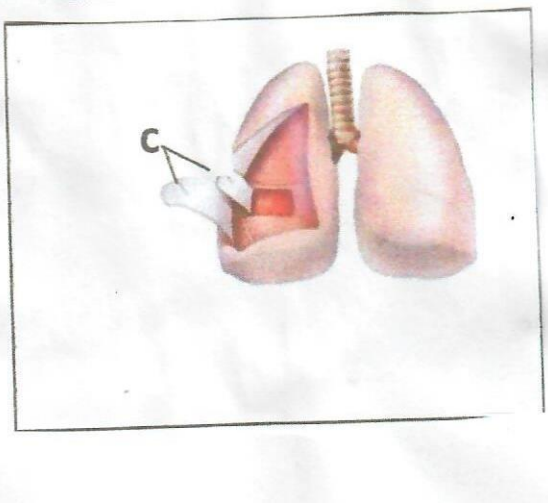
d) State the function of element N and explain one functional adaptation of element N.

(i) Function of N (1 mark)

(ii) Functional adaptation ofN (2 marks)

e) Study the diagrams below and answer the questions that follow.





(i) Name the parts labeled A, B, C and D (2 marks)

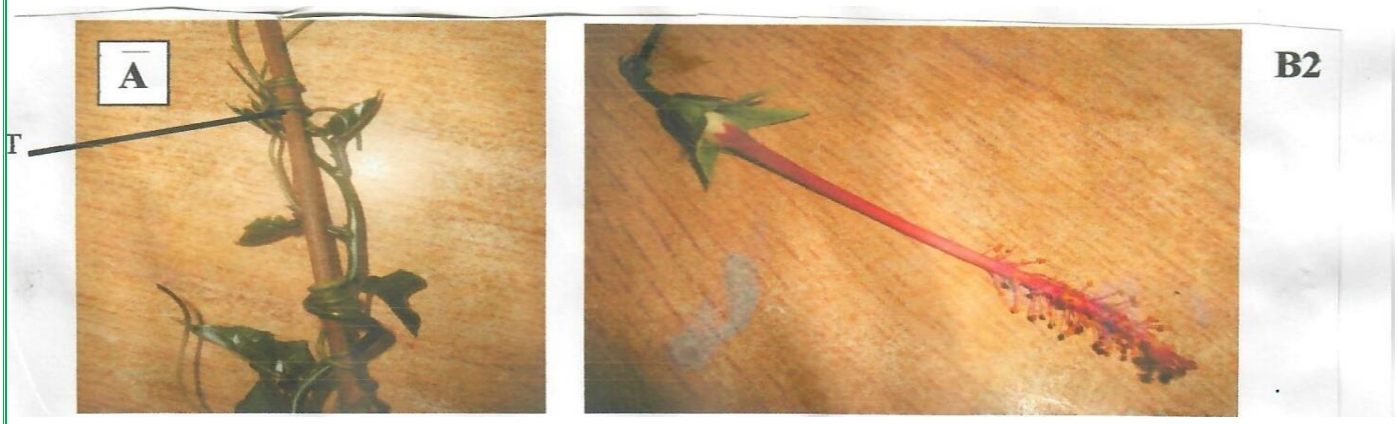
(ii) State the adaptation of the part labeled A to its function. (2 marks)

f) Identify the structures that perform similar functions as D above in:

(i) Amoeba. .. .. (1 mark)

(ii) Fish. ..... (1 mark)

3. (a) Examine photograph A, Bl and B2 carefully and answer the questions that follow. B2 was extracted from Bl



(i) What name is given to the coiled part labeled T found on specimen A (1 mark)

(ii) Name the type of response exhibited by the coiled part on specimen A (1 mark)

(iii) Name the stimulus responsible for the response named in (ii) above. (1 mark)

(iv) Explain how the response exhibited by the coiled part on specimen A occurred.(2 marks)

(v) State the biological significance of the response described in (iv) above to the survival of the specimen.

(1 mark)

(b) Use photographed specimen labeled Bl and B2 above to answer the questions below.

(i) State the agent ofpollination for the specimen above. (1 mark)

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

(iii) Describe the external features of leaves of the specimen B

(iv) Based on the floral parts, state the class to which specimen B belongs.

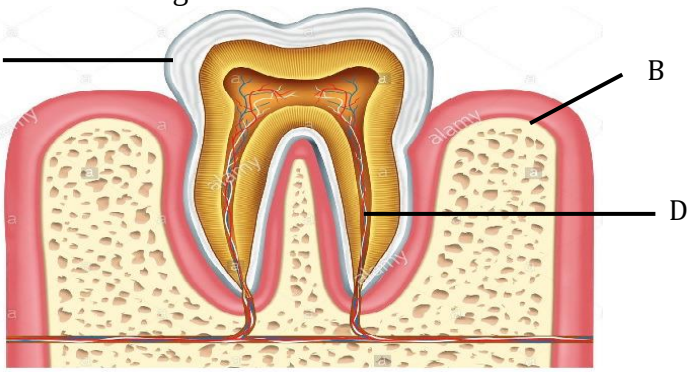
(v) Give a reason for your answer:in (iv) above

KCSE PREDICTION 8 2022

PAPER 1

1. How does growth as a characteristic of living organisms differ in plants and animals ? **(2marks)**
2. a)State the role of active transport in animal nutrition **(1mark)**

b) Cyanide lowers the rate of active transport. Explain? **(2marks)** The figure below is a diagram of a vertical section of a mammalian tooth.

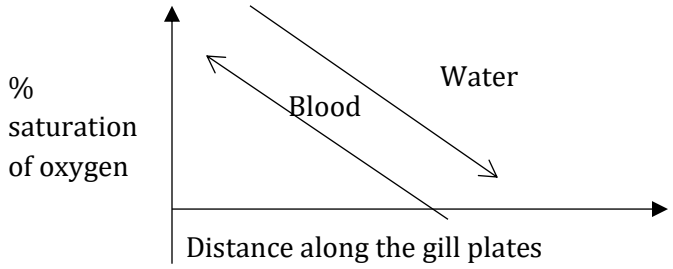


(i) Name the part labelled **A** and **B**. **(2 marks)**

(ii) State ***two*** ways in which structure **D** is adapted to its functions. **(2 marks)**

(iii)List ***two*** ways of preventing gingivitis. **(2 marks)**

3. The figure below shows % saturation of oxygen in blood in fish as water passes along the gill plate.



(a) (i) Name the type of blood flow shown in the gill plate. **(1mark)**

…… (ii) Explain the advantage of the type of flow named in a (i) above **(2marks)**

(b) State **<u>two</u>** organs in humans which display the type of flow named in a (i) above **(2marks)**

(c) State **two** ways in which floating leaves of aquatic plants are adapted to gaseous exchange **(2marks)** The equation below shows an oxidation reaction of food substances.

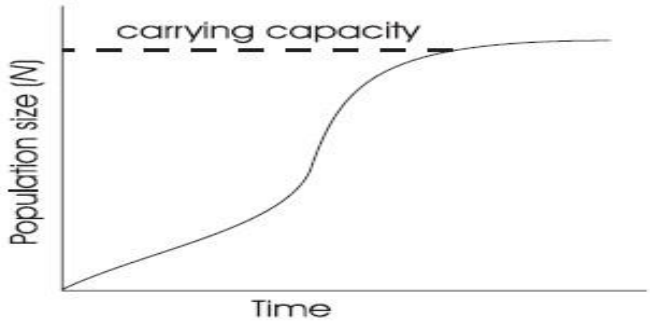
$C_{51}H_{98}O_6 + 145O2$ ------- X CO2 + 98 H2O + energy

a) What do you understand by the term respiratory quotient? **(1mark)**

b) Determine respiratory quotient of the oxidation of food substance. **(2marks)**

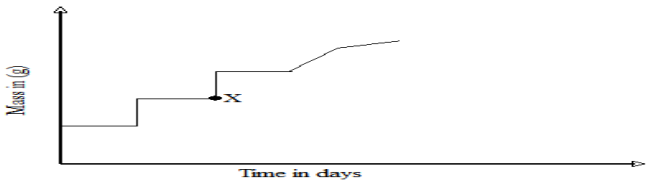
c) Identify the food substances. **(1mark)**

4. When any one of the growth parameters such as growth in size or weight, increase in number of cells are plotted in a graph against time like below, a clear curve is obtained



State its name……..... **(1mark)**

5. The graph below represents the growth in a certain phylum.



How does this differ from growth in humans? **(1mark)**

6. The embryo of a dry, fully developed seed usually passes through a period of rest after ripening period and it cannot germinate even when provided with all favorable conditions. State the significance of this. **(2marks)**

7. a) Cowpeas seeds were place in a vacuum flask and left for five days. What is the expected change in composition of gases in the flask on the sixth day? **(1mark)**

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

8. Biotechnologist works day a night to curb food insecurity using the knowledge of polyploidy in genetics. Explain the economic importance of such practice? **(2marks)**

b) Define a backcross? **(1 mark)**

9. The structure below was obtained from an animal cell

a) What is the name of the hair like processes and state its function? **(2marks)**

b) From which parts of the mammalian body are these structures found? **(1mark)**

c) State the effect of cigarette smoking to the structure? **(1mark)**

12. A student was found to have blood group B+

a) What type of antibody is present in his plasma? **(1mark)**

b) Which antigens are present in this blood group? **(1mark)**

13. Plants relatively have less waste to excrete than animals. Give two reasons to explain this observation **(2marks)**

14. State **two** methods by which plants get rid of their waste products **(2marks)**

15. To estimate the population size of mosquitoes in Banji village that covers an area of $25km^2$, visiting researchers caught 400 mosquitoes which they marked and released. After 24 hours, 200 mosquitoes were caught out of which 120 had not been marked.

(a) Suggest the sampling method described above. **(1 mark)**

(b) What are the disadvantages of this method? **(2 marks)**

16. The table below shows stomatal distribution on leaves A and B and their surface area. Use the information to answer the questions.

	Leaf surface	A	B
Number of stomata	Upper leaf surface	20	5
	Lower leaf surface	0	15
Surface area		$25\ cm^2$	$18cm^2$

Identify with reasons the habitats of the plant from which the leaves were obtained.

Leaf A: **(2 marks)**

Habitat ……..……..……..……..

Reason ……..……..……..……..……

Leaf B: **(2 marks)**

Habitat ……...……

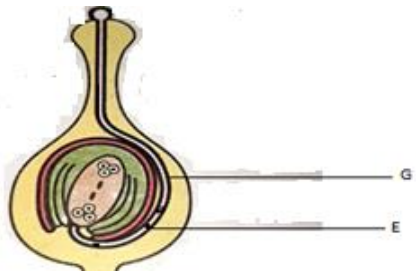
Reason ……

17. Name the causative agent of the following diseases **(2 marks)**

(i) Trichomoniasis.

(ii) Gonorrhea

18. The diagram below shows a pollen tube as it develops down the style. Use it to answer the questions that follows;



(i) Name the part labelled **G**. **(1 mark)**

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

19. (a) Define parthenogenesis? **(1 mark)**

(b) Name the plant hormone that induces fruit ripening. **(1 mark)**

20. A group of Form Three students collected a certain specimen for study as shown below. Study it carefully and use it to answer the questions that follow.

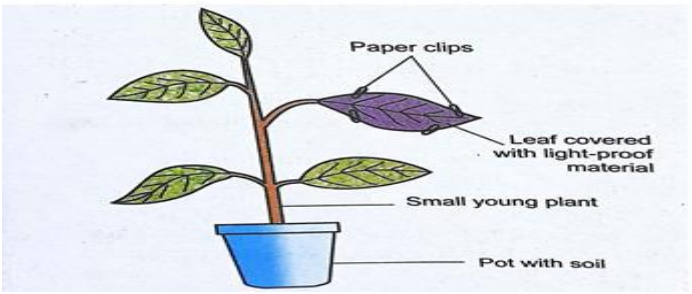
(i) Name the type of metamorphosis in the above specimen. **(1 mark)**

(ii) Give any ***two*** advantages of the above metamorphosis. **(2 marks)**

21. (i) Give ***two*** structural features in a leaf that adapts it to absorb Carbon (IV) Oxide. **(2 marks)**

(ii) Name the cell organelle in which Carbon (IV) oxide combines with water to form a complex organic compound takes place **(1 mark)**

22. In an experiment to investigate a factor affecting photosynthesis; leaf of a potted plant, which had been kept in the dark overnight was covered with an aluminum foil as shown in the diagram below. The set up was kept in the sunlight for three hours after which a food test was carried out on the leaf.



(a) Which factor was being investigated in the experiment? **(1 mark)**

(b) Which food test was carried out? **(1 mark)**

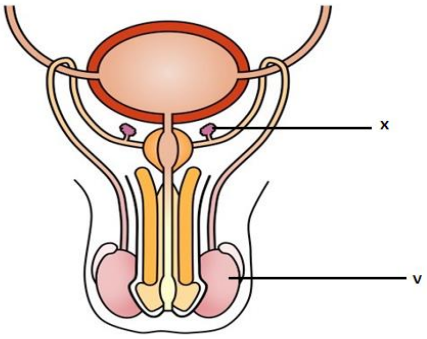
(c) State the results of the food test. **(1 mark)**

23. Explain how the following plant adaptations minimizes rate of transpiration **(2marks)**
a) Sunken stomata
b) Thick cuticle

24. Explain how drooping of leaves on a hot sunny day is advantageous to a plant **(2marks)**

25. Name **two** tissues in plants which are thickened with lignin **(2marks)**

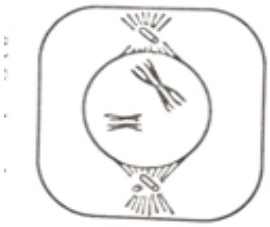
26. The diagram below shows the front view of a male reproductive system.



a) Give the functions of the structures labelled **X** and **V** **(2marks)**
b) What is the role of Follicle Stimulating Hormone in male reproduction? **(1mark)**

27. Explain why the concentration of insecticides in fish eating birds may be hundreds of times greater than its concentration in the water where the fish live **(3marks)**

28. The diagram below shows a stage in meiosis



State the biological significance of the stage represented on the diagram above **(1mark)**

29. How do the following factors hinder self-pollination in flowering plants? **(3marks)**

a) Self-sterility
b) Heterostyly
c)Protogyny

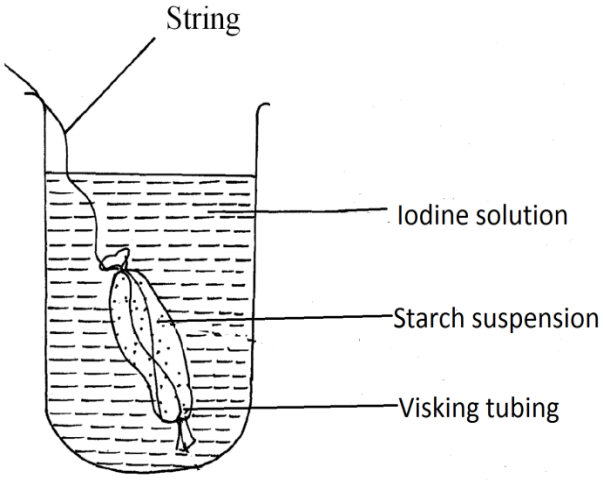
PAPER 2

1. Study the table below and answer the questions that follow. Organisms A and B are of the same size.

FOOD SUBSTRATE	Organism A	Organism B
	Amount of energy produced in KJ/MOL	Amount of energy produced in KJ/MOL
Carbohydrates	2898	211
Fats	6478	375
Proteins	3750	222

a) Name the process that is responsible for the energy production in organism A. (1mark)
b) Account for the energy production in organisms A and B. (2 marks)
c) State **two** reasons why fats are not the main food substrate in organism A. (2 marks)
d) Explain how age affects energy production in organism A. (2 marks)
e) State **one** economic importance of the process that occurs in organism B. (1 mark)

2. An investigation was performed by a group of students as shown in the set up below.



After 30 minutes, the starch suspension had turned blue-black while iodine solution retained its colour.
(a) Name the physiological process that was being investigated in the experiment. (1 mark)

(b) Account for the results observed after 30 minutes. (3 marks)

(c) Explain what would happen to a red blood cell when placed in distilled water and left to stand for the same duration as for the experiment above. (3 marks)

(d) Define cell physiology. (mark)

3 .In an investigation, equal amounts of water was placed in three test tubes A, B and C. Water plant of equal length were dropped in each test tube. The test tubes were then placed in identical conditions of light and carbon iv oxide at different temperatures for five minutes. After five minutes, the bubbles produced in each test tube were counted for two minutes .The results were recorded in the table below.

Test tube	Temperature (°C)	Number of bubbles
A	25	30
B	36	42

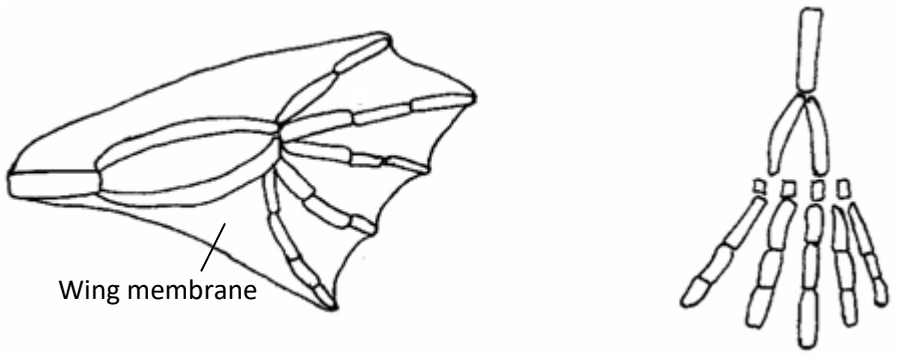
C	57	12

(a) (i) Name one requirement for this process that is not mentioned in the investigation (1mark)
ii.Name the gas produced in the investigation (1mark)
iii Account for the results in the test tube B and C (2 marks)
(b) State **two** ways in which the human intestinal villus is adapted to its function. (4 marks)

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

(a) What are the possible phenotypes of the offspring of a man who is heterozygous and a woman who is also heterozygous? Show your working. (5 marks)
(b) Sickle cell trait is more prevalent in tropical countries than in temperate countries. Give an explanation for this observation. (2 marks)
(c) Define non-disjunction (1 mark)

5. The diagram below shows structures of the bat wing and human arm.



(a)These structures are thought to have same ancestral origin. State one structural similarity and one adaptational difference between the two.
(i) Structural similarity. (1 mark)
(ii) Adaptation difference. (2 marks)
(b) Give **two** other examples of structures in nature that show the type of evolution as in (a) above. (2 marks)
(c) Distinguish between the terms 'chemical evolution' and 'organic evolution'. (2 marks)
(d) What is the study of fossils called? (1 mark)

6. The table below shows how quantities of sweat and urine vary with external temperatures

External temperature (^{0}c)	Urine cm^3/h	Sweat cm^3/h
0	100	5
5	90	6
10	80	10
15	70	20
20	60	30
25	50	60
30	40	120
35	30	200

(a) Using the same axes, draw a graph of quantity of urine and sweat against the external temperature. (7 marks)

(b) (i) State the quantity of urine and sweat produced when external temperature was 12.5^0c. (2 marks)

(ii) State the physical process through which the body was cooled by sweating as temperature was rising. (1 mark)

(iii) Account for the quantity of urine produced as the temperature increased. (4 marks)

(c) State three nitrogenous wastes that could be eliminated in urine or sweat in human beings. (3 marks)

(d) State three behavioral mechanisms that poikilotherms use to regulate their body temperature under hot conditions. (3 marks)

7. Describe how mammalian heart is adapted to its functions. (20 marks)

8. Giving examples, describe the following relationships among living organisms. (20 marks)

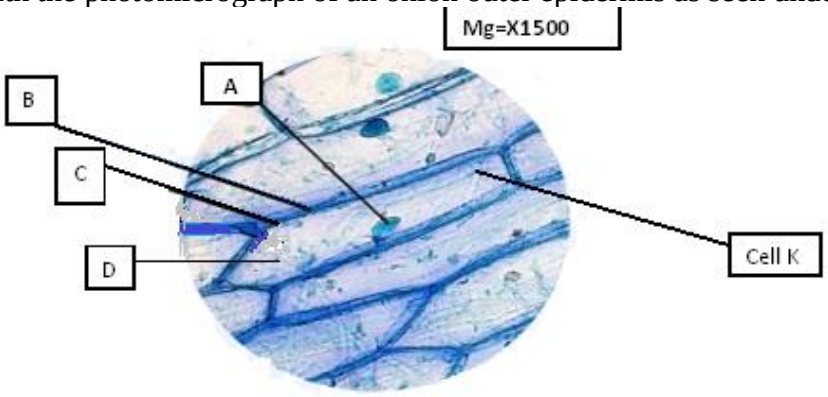
(i) Parasitism

(ii) predator-prey

(iii) Symbiosis

PAPER 3 (PRACTICAL)

1. You are provided with the photomicrograph of an onion outer epidermis as seen under light microscope



a) On the photograph, name parts labelled A, C, and D **(3mark)**

a) Explain how the part **labelled B** is adapted to its function **(2marks)**

b) Calculate the actual size of the cell **marked K**, give your answer in micrometres **(2marks)**

c) The differences between the cells in the photograph and those obtained from an animal epithelial cells **(3marks)**

Onion epidermal cells	Animal epithelial cells

d) State the process that make the structures in the cell above appear more distinct **(1mark)**

e) In microscopic procedure in 1 (d) above name what was used to achieve the process

2. The photographs below represent specimen labeled A, B, C and D

SPECIMEN A	**SPECIMEN B**
	
SPECIMEN C	**SPECIMEN D**
	

i) Name the type of placentation shown in specimen A and B **(2 marks)**

ii) Identify the type of sections from which specimen **C** and D was obtained? **(2 marks)**

iii) Classify the above specimen labeled D **(1mark)**

iv) You are provided with specimen labeled **D1, D2, D3** and **D4**. Examine them
Draw and label specimen labeled **D2** **(3marks)**

v) Giving a reason and state the agent of dispersal of the specimen **(6marks)**

Specimen	**Agent of dispersal**	**Reason**
D1		
D3		
D4		

3. You are provided with the following. Solution **P**, **Q** and **Z**.

(a) (i) Put 2 cm^3 of solution **P** into two test tubes labeled **A** and **B**. Add iodine solution drops into test tube **A**. Observe and record. **(1 mark)**

(ii)To test tube **B**, add an equal amount of Benedict's solution. Heat to boil. Record your observation. **(1 mark)**

(iii) From the results in (a) (i) and (ii), identify solution **P**. **(1 mark)**

(iv). Put 2cm^3 of solution **Z** into a clean test tube labelled **C**. Add equal volume of Benedict's solution. Heat to boil. **(1 mark)**

(v) Open the visking tubing provided, Pour solution **P** into the visking tubing and add 1cm^3 of the solution **R**. Tie the visking tubing and ensure there is no leakage. Pour solution **Z** into a clean beaker till it is half full. Immerse visking tube in the solution **Z** in the beaker. Allow it to stand for 30 minutes. After 30 minutes, take 2cm^3 of solution **Z** from the beaker into a clean test tube labelled **D**. Add equal amount of Benedict's solution. Heat to boil. Record your observation. **(1 mark)**

(vi)Account for the observation made in (v) above. **(3 marks)**

(b) i) Pour 2 cm^3 of solution **Q** into a clean test tube. Observe and record the color of solution **Q.** **(1 mark)**

ii) Add 1 cm^3 of sodium hydroxide into test tube containing solution **Q**. Record your observation. **(1 mark)**

iii) Explain the results observed in (b)(ii) above. **(2 marks)**

iv). what is the identity of solution **R?** **(1 mark)**

v) State **one** factor that can affect the process demonstrated in 3a **(v)** above **(1 mark)**

KCSE PREDICTION 9 2022

PAPER 1

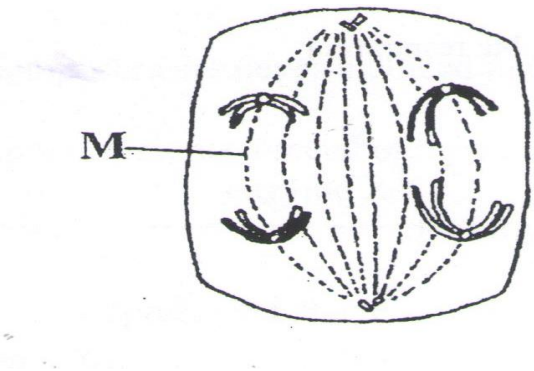
1. Name the part of a flower that develops into:

[i] Seed [1 mark]

[ii] Fruit [1 mark]

2. State **two** ways in which floating leaves of aquatic plants are adapted to gaseous exchange[2 marks]

3. The diagram below represents a stage during cell division



[a] [i] Identify the stage of cell division [1 mark]

[ii] Give **two** reasons for your answer in [a] [i] above [2 marks]

[b] Name the structure labeled M [1 mark]

4. [a] Distinguish between the terms [2 marks]

Homodont and heterodont

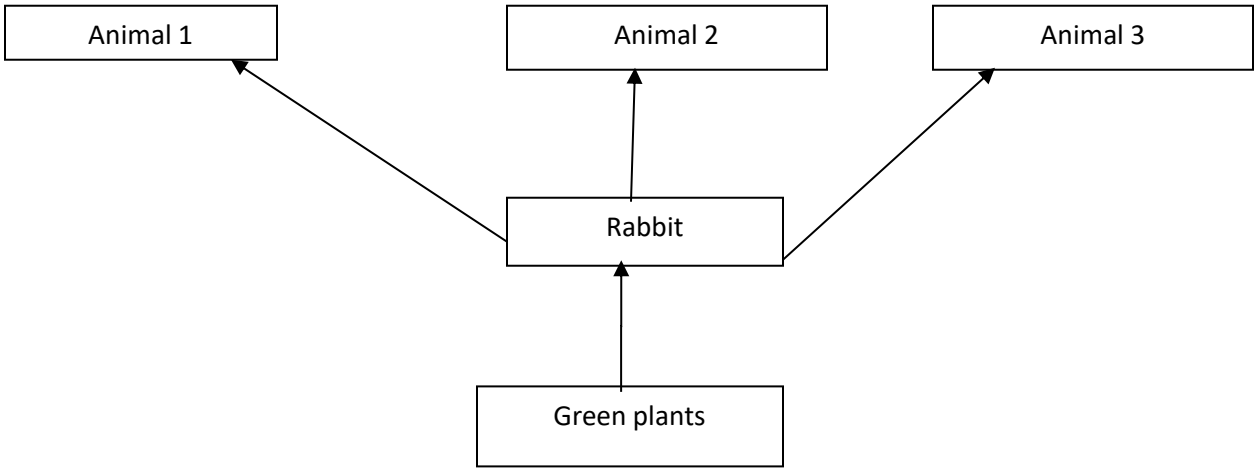
[b] What is the function of the carnassial teeth [2 marks]

5. A patient with blood group A was involved in a road accident and required urgent blood transfusion. His relatives were invited to donate blood.

[a] Name the compatible blood groups [2 marks]

[b] State why other blood groups were not compatible [2 marks]

6. The flow chart shows a part of a food relationship in an ecosystem



[a] [i] Name the food relationship shown [1 mark]

[ii] How many trophic levels are shown in the diagram [1 mark]

[b] What is the main source of energy in the ecosystem [1 mark]

7. Name the only epidermal cell in plants that contain chloroplast [1 mark]

8. The equation below represents a metabolic process that occurs in the mammalian lives

Amino Acids $\xrightarrow[\text{Enzyme x}]{}$ organic compound

[a] Name the process that represents the above equation [1 mark]

[b] Identify the enzyme represented by x [1 mark]

[c] What is the importance of the process to the mammal [1 mark]

9. [a] Name the carbohydrate that is stored in mammalian muscle [1 mark]

[b] What name is used to describe removal of indigestible and undigested food material from the alimentary canal [1 mark]

10. [a] Carl Linnaeus developed the taxonomic units of classification

[i] What is taxonomy [1mark]

[ii] Why was the system of classification by Carl Linnaeus described as natural system of classification [2 marks]

11. Phagocytes also called granulocytes or polymorphs are cells found in the blood that ingest pathogens and cell debris

[i] Why are they called polymorphs. [1 mark]

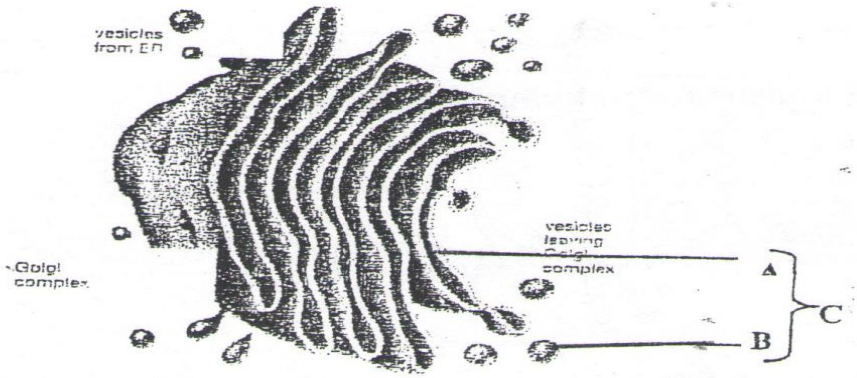
[ii] Name the cell organelle most abundant in phagocytes that enable them function effectively. [1 mark]

12. Name the

[a] Material that strengthens xylem tissue [1 mark]

[b] Tissue that is removed when the part of a plant is ringed [1 mark]

13. The diagram below represents a cell organelle.



[i] State the function of this organelle [1 mark]

[ii] Name each of the parts A and B

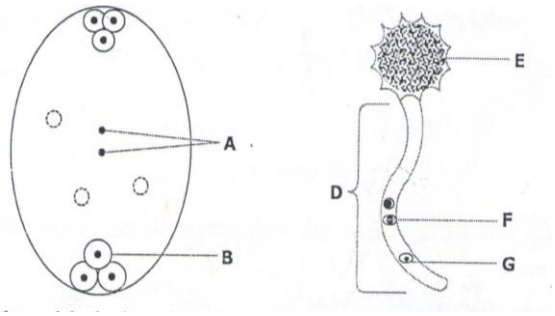
14. In which two ways do guard cells differ from other epidermal cells [2 marks]

15. [a] Through cellular respiration, the chemical energy stored in glucose molecule is converted into which specific molecule [3 marks]

[b] Name the substance that speed up biochemical reaction [1 mark]

16. During germination and early growth, the dry weight of endosperm decreases while that of embryo increase explain. [2 marks]

17. The diagrams below show changes in the life cycle of flowering plants.



[i] Complete the table below by choosing the letters from the diagram which refers to each of the stages given. [4 marks]

STAGE OF LIFE CYCLE	LETTER
Male gametophyte	
Tube nucleus	
Female gamete	
Male gamete	

18. State **two** characteristics of kingdom Monera that are not found in other kingdoms. [2 marks]

19. State **three** ways by which plants compensate for lack of the ability to move from one place to another. [3 marks]

……

……

……

……

……

20. State **three** physiological processes that are involved in movements of substances across the cell membrane. [3 marks]

……

……

……

……

……

21. If the human pancrease is not functional:

[a] Name the hormone which will be deficient. [1 mark]

……

……

[b] Name the disease the human is likely to suffer from. [1 mark]

……

……

22. The oxidation state of a certain food is represented below by a chemical equation.

$$2C_3H_2O_2N + 6O_2 \longrightarrow (NH_4)_2CO_2 + 5CO_2 + 5H_2O$$

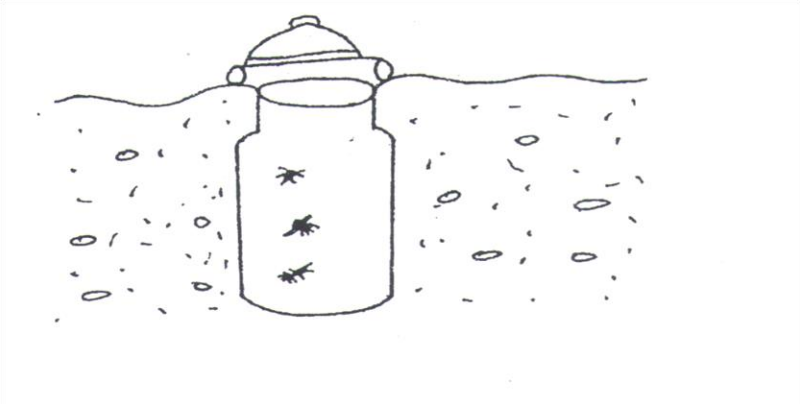
[a] Calculate the respiratory quotients [RQ] of the food substance. [2 marks]

[b] Identify the food substrate [1 mark]

……

……

23. The diagram below shows an apparatus used during collection of specimen.



[a] Identify the apparatus [1 mark]

……

……

[b] What is the use of the apparatus named above [1 mark]

……

……

24. State **two** physical factors in an ecosystem that affect the distribution of organisms. [2 marks]

……

……

……

……

……

25. A DNA strand has the following base sequence G C C T A G A T C A C.
What is the sequence of the

[i] Complementary DNA strand [1 mark]

……

……

[ii] M-RNA strand copied from this DNA strand . [1 mark]

……

……

26. State **three** limitations of fossil records as evidence of organic evolution [3 marks]

……

……

……

……

……

27. Explain the term "Resistance" as used in evolution of living organisms [2 marks]

……

……

……

……

……

28.State the function of the following parts of a light microscope .

[i] Body tube [1 mark]

……

……

[ii] Diaphragm [1 mark]

……

……

29. The table below shows analogies of gene mutations. [3 marks]

	Intended message	**Actual message**
A	Buy me a skirt	Buy me a shirt
B	This is my team	This is my mate
C	Auntie is staying	Auntie is straying

Identify the type of gene mutation illustrated

A ……..

B……

C ……

30. State **two** sources of variations. [2 marks]

……

……

…….

31. Name the diseases caused by each of the following [2 marks]

(a) *Plasmodium falciparum*

……

……

……

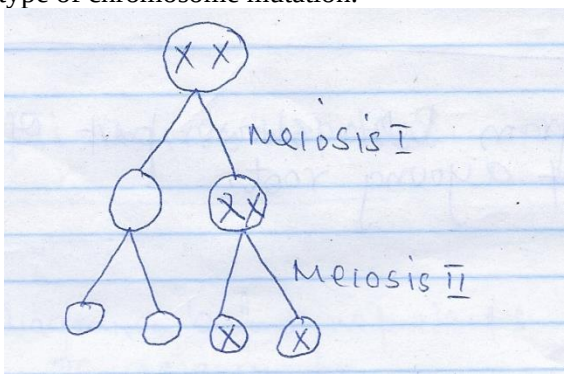
(b) *Entamoeba histolytica*

PAPER 2

SECTION A (40MKS)

Answer ALL questions in this section in the spaces provided.

1. The diagram below illustrate a type of chromosome mutation.



(a) (i) Identify the type of chromosome mutation illustrate above. (1mk)

……..

(ii) State two examples of disorders in humans that are caused by the mutation named in a(i) above. (2mks)

(i)

……..

(ii)

……..

(iii) Name a disorder of blood that is caused by gene substitution. (1mk)

……..

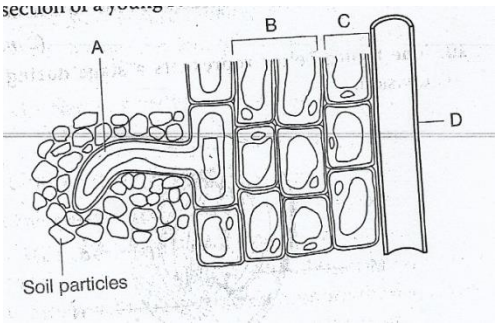
(b) State three differences between deoxyribonucleic acid (DNA and ribonucleic acid. (3mks)

DNA	RNA
i) ……..	……
…….	……
ii)……..	……
…….	……
iii)…….	…….
…….	…….

c) Define the term mutation ……

……(1mk)

2. The diagram below shows part of a longitudinal section of a young root.



(a) Name he parts labeled A, B, C and D. (4mks)

A - C -

B - D –

(b) State the importance of the cell labeled A. (1mk)

……

……

(c)How is the tissue labeled D adapted to the function it performs. (3mks)

……

……

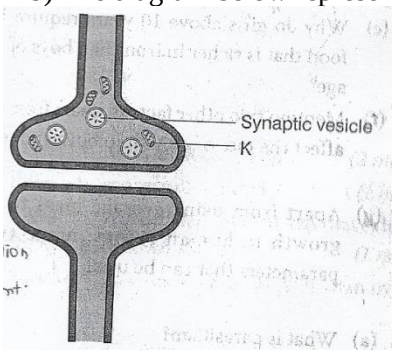
……

3. a) What is a nerve impulse? (2mks)

……

……

b) The diagram below represents a neuro-junction of a mammal.



On the diagram, indicate with an arrow the direction of impulse transmission. (1mk)

(c) Name the chemical substance that is contained in the synaptic vesicle. (1mk)

……

(d) State the function of the part labeled K in the diagram. (1mk)

……

……

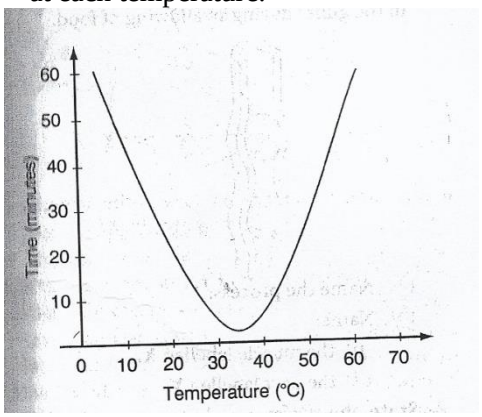
(e) Name two mineral ions that are involved in the transmission of nerve impulses. (2mks)

(i)

(ii)

4. In an experiment to investigate he action of pepsin on egg albumen, equal amounts of pepsin were added to equal amounts of egg albumen in different test tubes. The test tubes were placed in water

baths at different temperatures. The graph below shows the time taken for the enzyme to digest protein at each temperature.



(a) (i) What is the optimum temperature for the enzyme? (1mk)

……

……

(ii) Account for the time taken to digest egg albumen at 60^0C. (2mks)

……

……

……

……

(b) By giving a reason, name the form in which pepsin enzyme is secreted. (2mks)

……

……

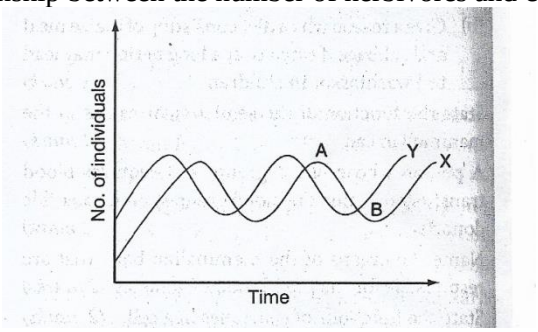
(c) State three other factors that affect enzyme controlled reactions. (2mks)

(i)

(ii)

(iii)

5. The graph below shows the relationship between the number of herbivores and carnivores in a park.



(a) Identify the cure that represent carnivores. Give a reason for your answer. (2mks)

……

……

(b) Suggest a reason for the slope of curve X between points A and B. (2mks)

……

……

(c) (i) Name the type of relationship that exist between herbivores and carnivores as indicated in the graphs. (1mk)

……

……

(ii) State the significance of the relationship you have stated in C(i) above. (1mk)

……

……

(d) What will be the long term effect on the park ecosystem if all carnivores were eliminated from the park. (1mk)

……

……

……

……

……

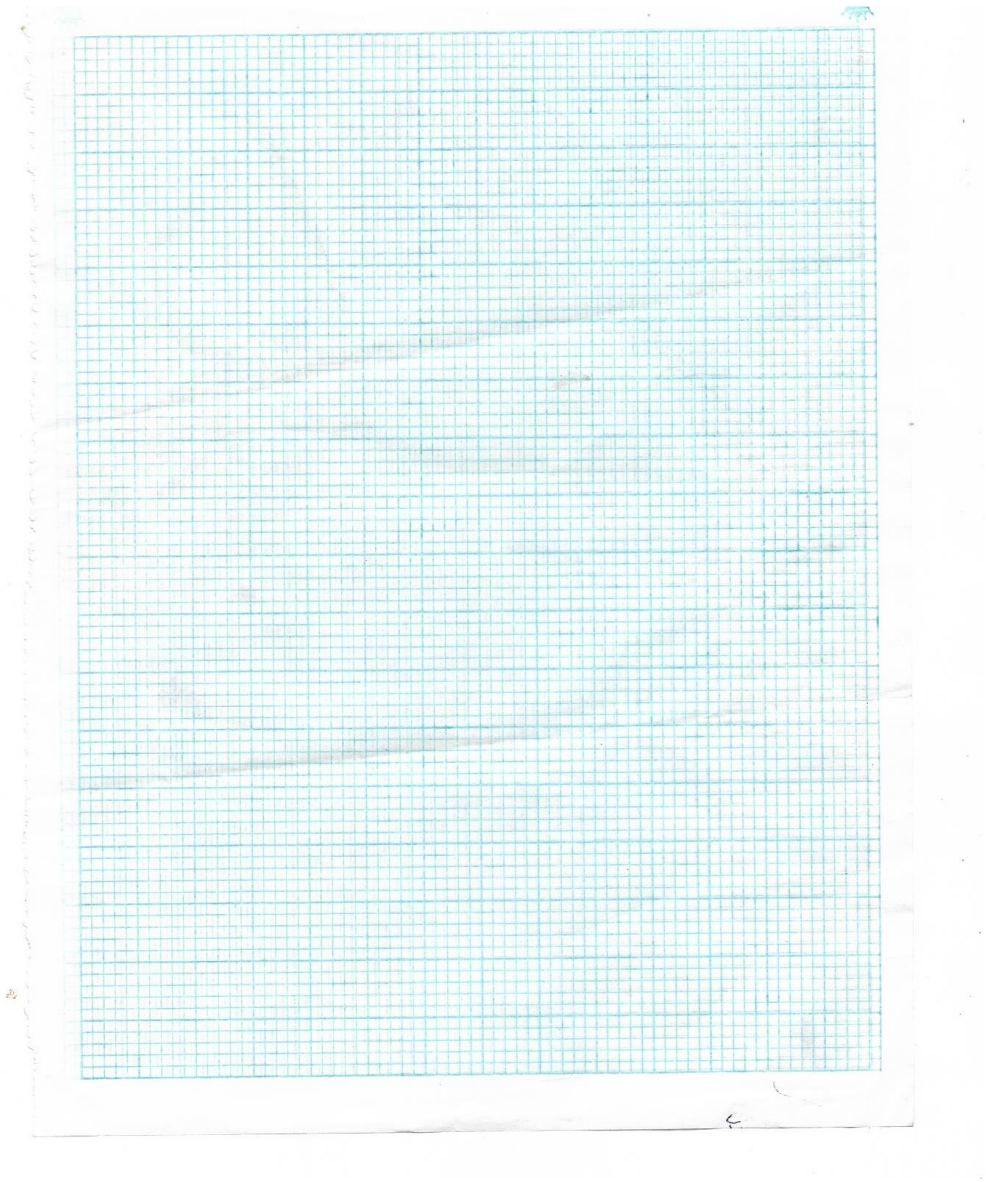
SECTION B (40MKS)

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

6. Research was carried out to determine the growth rate of some boys and girls. Their average mass in Kilograms was taken separately for 20 years. Their weight are tabulated as shown in the table below.

Age	Average Mass of (Boys(Kg)	Average mass of girls Kg.
0	2.5	2.5
2	11.1	11.5
4	15.00	16.0
6	18.5	19.3
8	22.1	27.1
10	25.1	27.2
12	27.00	30.00
14	37.00	36.00
16	44.00	44.00
18	47.0	52.00
20	48.5	55.00

(a) On the same axis, plot graphs of the average mass of the boys and the girls against their age. (7mks)



(b) From the graph, determine the

(i) Mass for boys at the age of 11 years. (1mk)

……

……

(ii) Growth rate for girls between ages 13 and 15. (2mks)

……

……

(c) Account for the change in the mass of girls during the age stated in (ii) above. (2mks)

……

……

……

……

……

……

……
…

(d) Explain the trend observed in the curves for both boys and girls. (3mks)

……
……
……
……

(e) Why do girls above 10 years require intake of food that is richer in iron than boys of the same age? (1mk)

……
……

(f) Name two other factors, apart from diet, that affect the rate of growth in boys and girls. (2mks)

……
……

(g) A part from using average mass to estimate growth in human beings, name two other parameters that can be used. (2mks)

……
……
……..

7. a) What is homeostasis. (2mks)

……
……

b) Discuss the homeostatic functions of the mammalian liver. (18mks)

8. Describe how xerophytes are adapted to their habitats. (20mks)

PAPER 3

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

Specimen **R**
Benedict's solution
Sodium hydroxide solution
Copper sulphate solution
Source of heat
3 test tubes in a rack
Droppers
Scalpel/Razor blade
Pestle and mortar
Filter paper
Study the specimen **R** provided.

(a) Identify the type of fruit. (1 mark)

(b) With reasons, identify the method of dispersal for the specimen.
Method of dispersal (1 mark)
Reasons (2 marks)

(c) By use of the scalpel provided, peel off the outer cover of the specimen **R** to reveal the inner juicy part. Extract a small portion of the juicy part, place in a mortar and mash it using a pestle. Use the filter paper provided to filter the extract from the specimen R.

Divide the extract from specimen **R** into two portions each $2cm^3$ and use them as follows;

Portion one

Use the reagents provided to test for the food substances present in portion **1**. Use the table below as a guide. (6 marks)

Food substance	Procedure	Observation	Conclusion

Portion two

(d) (i) To $1cm^3$ of DCPIP in a test tube, add 0.1% solution of Ascorbic acid drop by drop until the colour of DCPIP disappears. Shake the test tube after addition of each drop. Record the number of droplets used. (1 mark)

……

ii) To another $1cm^3$ of DCPIP in a test tube add the **portion two** drop by drop, shaking the test tube after addition of each drop until the colour of DCPIP disappears. Record the number of drops used (1 mark)

……

iii) From the results obtained in (d) (i) and (ii) above, calculate the percentage of Ascorbic acid in the juice obtained from specimen **R**. Show your working (2 marks)

Study the photographs below and answer the questions that follow.

(a) (i) By use of a flow chart, show the possible energy flow in the ecosystem above. (1 mark)

(ii) State **two** ways in which energy is lost from one trophic level to the next one. (2 marks)

(b) With **observable reasons**, identify the classes of specimen **X** and **Z**

Specimen **X**

Class …… (1 mark)

Reasons (2 marks)

Specimen **Z**

Class (1 mark)

……

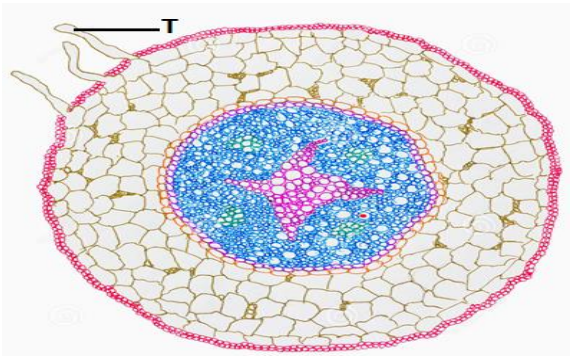
Reason (1 mark)

……....

(c) Describe **two** adaptations of organism labeled **Y** to its habitat. (2 marks)

……
……
……
……..

(d) Study the photograph below and answer the questions that follow. (1 mark)

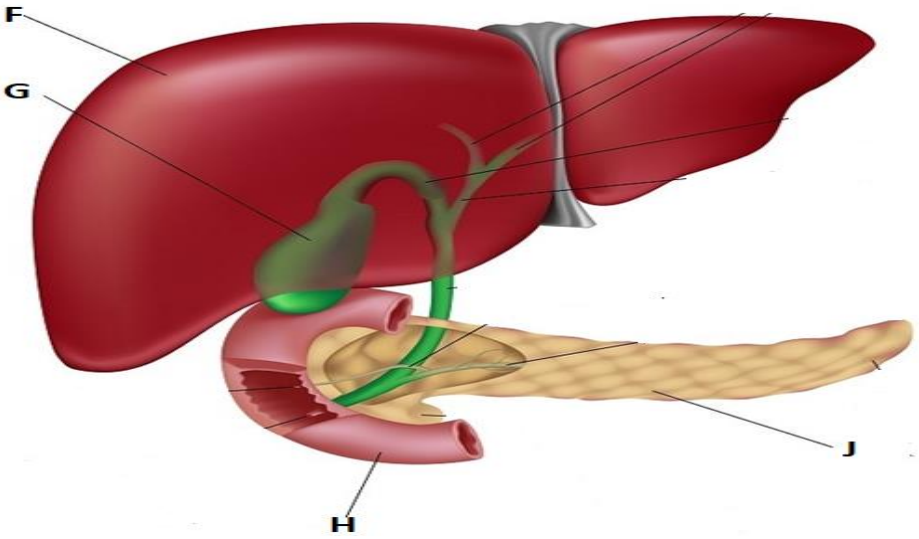


(i) Which part of the plant is represented by the cross-section shown above
……

(ii) Give **two** observable reasons for your answer in (d)(i) above. (2 marks)
……
……
……..

(iii) Give **one** adaptation of the part labeled **T** to its function. (1 mark)
……..
……
……

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



(a) Identify the following parts (2 marks)

F ……

G ……

(b) (i) Identify the secretions stored in part labeled **G** (1 mark)

……

……

(ii) Give **two** functions of the secretions you have identified in (b)(i) above. (2 marks)

……

……

……

(c) (i) Give **two** major roles of the part labeled **J**. (2 marks)

……

……

……

(d) (ii) State the hormone secreted by the part labeled **H.** (1 mark)

……

……

(e) Study the photograph below and answer the questions that follow.

(f) (i) Identify the following parts. (2 marks)

K ...……

L ……..

(ii) Give **two** adaptations of the part labeled **M** (2 marks)

……

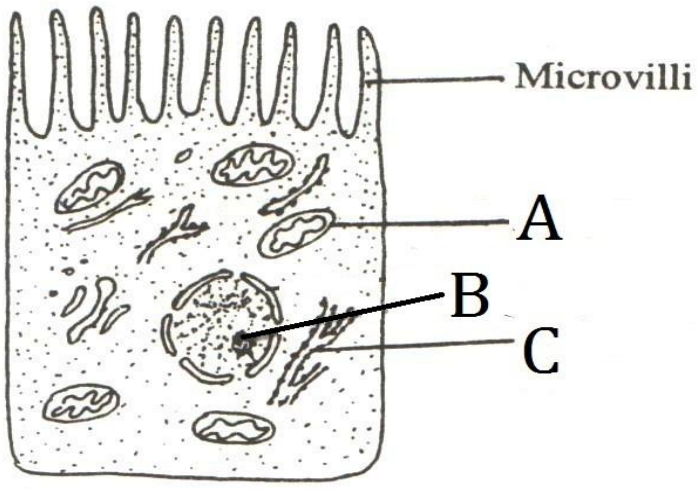
……

……

KCSE PREDICTION 10 2022
PAPER 1

Answer all the questions in the spaces provided.

1. The diagram below represents microvilli on epithelial cells



(a) Name the parts A and C (2mks)
A

C

b) Name two parts in the human body where the above epithelial cells are found. (2mks)

2. (a) Name two enzymes that are produced in their precursor forms. (2mks)

b) Name the substance that converts the enzymes named above to their active forms. (2mks)

3. Human beings are 'Homoiothermic.
(a) Explain the meaning of homoiothermic. (1mk)

(b.) What are the effects of the following in human beings? (2mks)

(i) Decrease in body temperature below the optimum level

(ii) Increase in body temperature above the optimum level.

iii) The pancreas of a mammal was surgically removed. A few hours later, glucose was found in urine of the mammal. Explain the observation. (1 mark)

4. A person walked bare feet in a swampy area. After a few weeks he started experiencing abdominal pains and diarrhoea. His urine and stool contained blood.
   (a) Name the disease the person was likely to be suffering from and the causative agent of the disease
   (i) Disease (1mk)

   (ii) Causative agent (1mk)

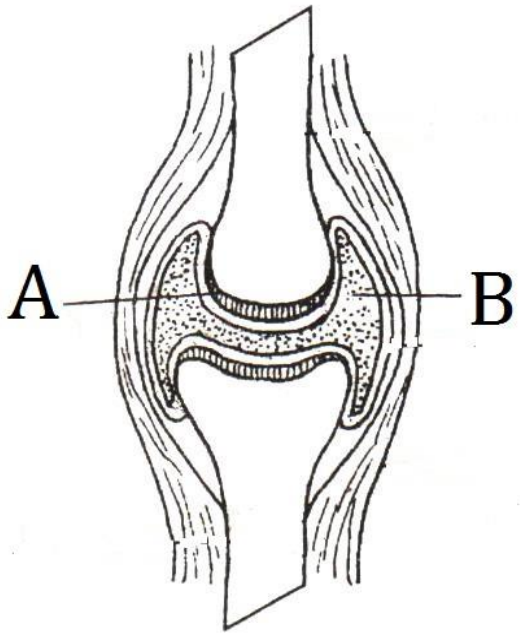
   (b.) Apart from avoiding walking bare feet in swampy area. State **two** other ways of controlling the disease. (2mks)

5. State the functions of the following parts of a brain. (3mks)
   (a) Thalamus

   (b) Midbrain

   (c) Medulla oblongata

6. The diagram below shows a joint in a mammal. Study it and answer the questions.



(a) State the functions of parts A and B (2mks)

A

B

(b) Name the type of joint illustrated by the diagram (1mk)

(c) State **two** adaptations of joint named in (b) Above (2mks)

7. (a) What is mutation? (1mk)

(b) Name **one** disorder caused by gene mutation and one disorder caused by chromosome mutation. (2mks)

Gene mutation----------

Chromosome mutation ----------

8. a) What is the disadvantage of self- pollination in plants? (1mk)

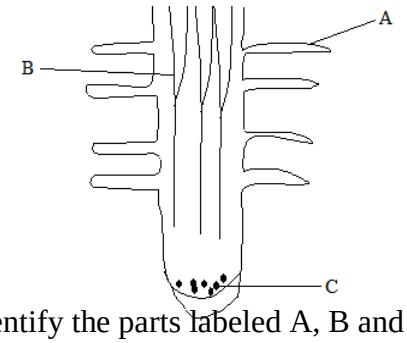
(b.) State **two** features that discourage self-pollination. (2mks)

9. State the importance of companion cell in phloem tissue. (1mk)

10. State **TWO e**ffects of gibberellins on shoots of plants. (2 Marks)

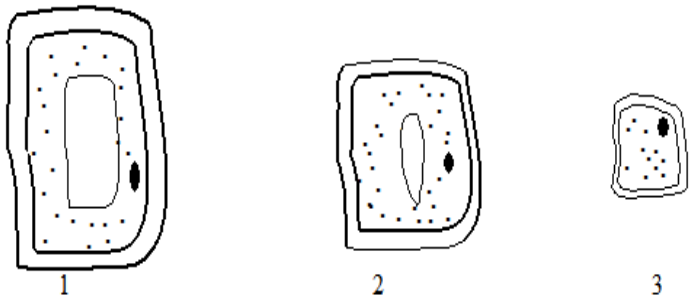
11. Distinguish between resolving power and magnifying power of a microscope (2 Marks)

12. The following diagram is a longitudinal section of a root apex.



a. Identify the parts labeled A, B and C . (3 Marks)

b. The figure below represents THREE cells 1, 2, and 3.



Identity the THREE regions of the root tip from which the cells were got from,
(3 Marks)

1

2

3

13. a) What is heterozygous advantage? (1 Mark)

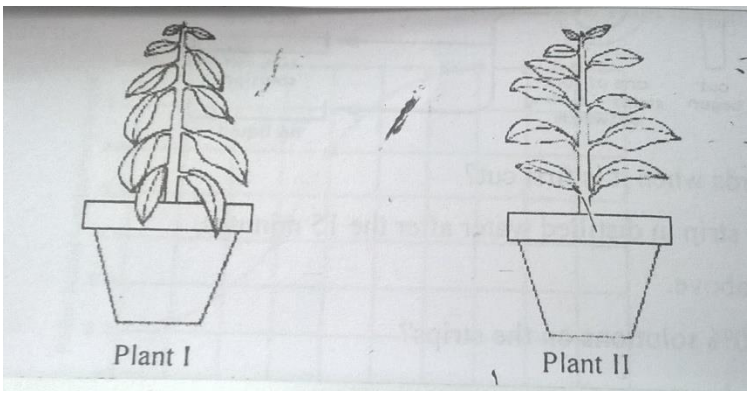
b) Give an example. (1 Mark)

14. After a colony of penicillin-sensitive bacteria was exposed to antibiotic pencillin, a penicillin resistant emerged. Explain this observation

(2 Marks)

15. What is meant by speciation? (2 Marks)

16. The diagram below shows two potted plants on a laboratory bench near a window.



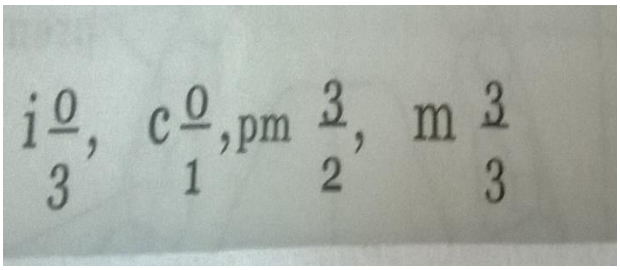
a) State one observable difference between the plants I and II. (1mark)

b) State the importance of the process that is seen in plant I. (1mark)

c) Explain the process that resulted to appearance of the leaves as in plant I above.
(1mark)

d) Suppose a cell from a leaf of each of the plants I and II is mounted and observed under a microscope. Draw a diagram of a cell from each of the plants leaves. (2marks)

17. Study the dental formula below.



a) Identify the mode of feeding carried out by the animal with this dental formula.
. (1mark)

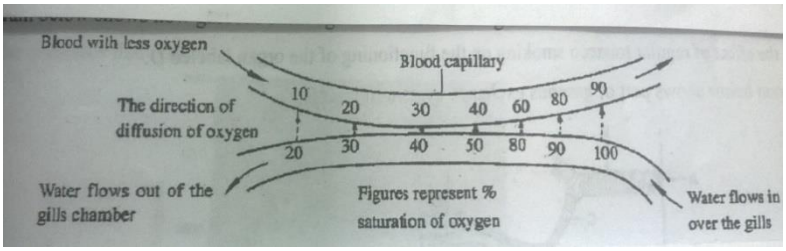
b) Give reasons for your answer in (a) above. (1mark)

c) State the role of carnassial teeth in a lion. .
(1 mark)

18. State **two** reasons why the stomach lining is not usually digested by pepsin though it is made of protein.
.
(2marks)

19. State **three** differences between Rods and Cones. (3marks)

20. The diagram below shows how gaseous exchange occurs across the gills of a fish.



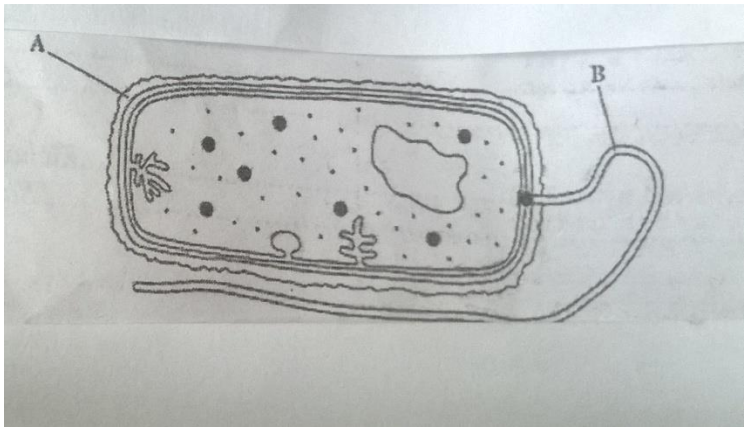
According to the diagram water and blood flows in opposite direction across the gills.

a) Give the term used to describe this flow. (1mark)

b) Explain the advantage of the above flow named in (a) above. (2marks)

c) What differences would be observed if water and blood flow across the gills in the same direction. (2marks)

21. The drawing shows a bacterial cell.



a) Name structures A and B. (2marks)

b) State the kingdom to which the cell above belongs. (1marks)

c) Give two observable reasons for your answer. (2marks)

22 a) What is the Rhesus factor? (1 mark)

b) A rhesus negative person received rhesus positive blood during transfusion. Explain why it is dangerous to give similar transfusion a second time. . (2 marks)

23. State three adaptive features of a desert plant. (3 marks)

24. The table below shows the oxygen consumption and carbon dioxide released at rest by a number of animals under certain conditions.

Animal	Body mass(g)	Oxygen consumption in cm^3 per hour	Carbon dioxide released in cm^3 per hour	Respiratory Quotient
Mouse	20	40	40	
Dog	10000	1960	2800	
Sheep	40000	4970	7100	
Horse	600000	700000	700000	

a) Complete the table in the last column showing respiratory quotient. (2marks)

b) From the completed table suggest which animal was oxidizing. (2marks)

i) Fats

ii) Carbohydrates

PAPER 2

SECTION A: *Answer all the questions in this section in the spaces provided.*

(a) What is meant by the term (2mks)

(i) Allele

(ii) Test cross

(b) Describe the following chromosomal mutations:

i) Inversion (1mks)

……

……..

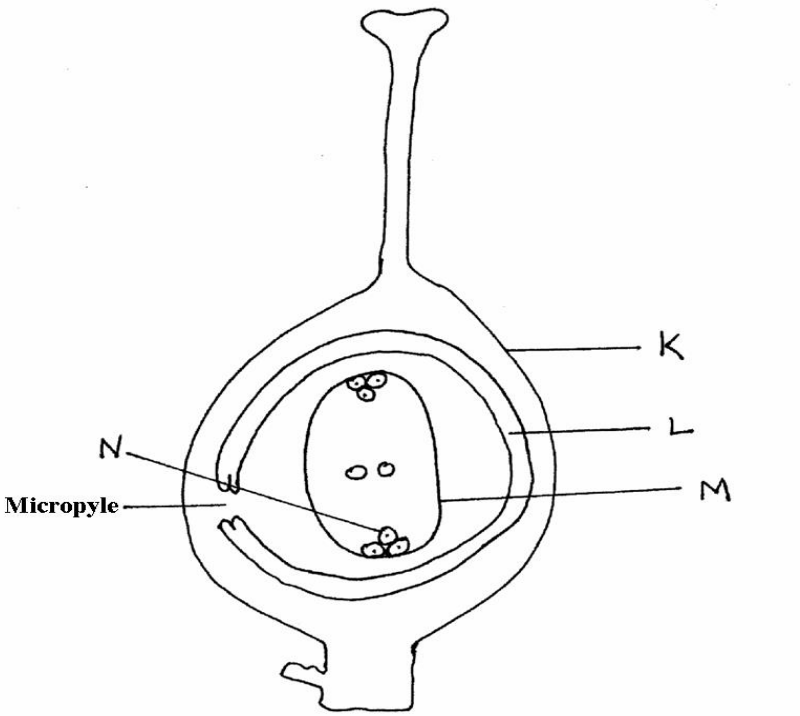
ii) Translocation (1mks)

……

…….

(c) In mice the allele for **black fur** is **dominant** to the allele for **brown fur**. What percentage of offspring would have brown fur from a cross between heterozygous black mice? Show your working. Use letter **B** to represent the allele for **black fur**. (4mks)

The diagram below shows a cross – section through a pistil.



(a) Name the structures labeled K, L and M: (3 mks)

K ……

L …….

M

……

(b) What do the following parts develop into after fertilization?: (2 mks)

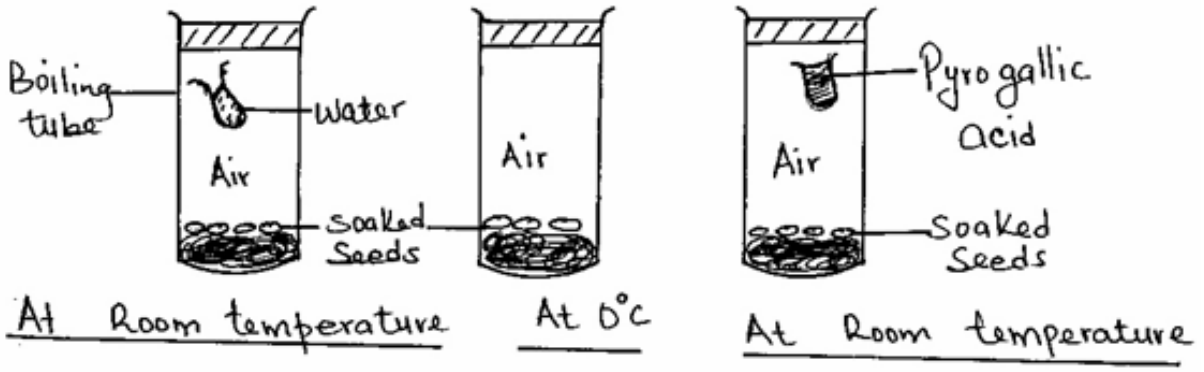
Part L:……

Part N:-……

(c) State three ways by which plants promote cross fertilization. (3 mks)

Study the diagrams below and answer the questions that follow.

A **B** **C**



(a) Identify the process being investigated. (1mk)

……

(b) With a reason identify the set-up in which germination will occur. (2mks)

……

……

……

(c) State **two** roles played by water during germination. (2mks)

……

……

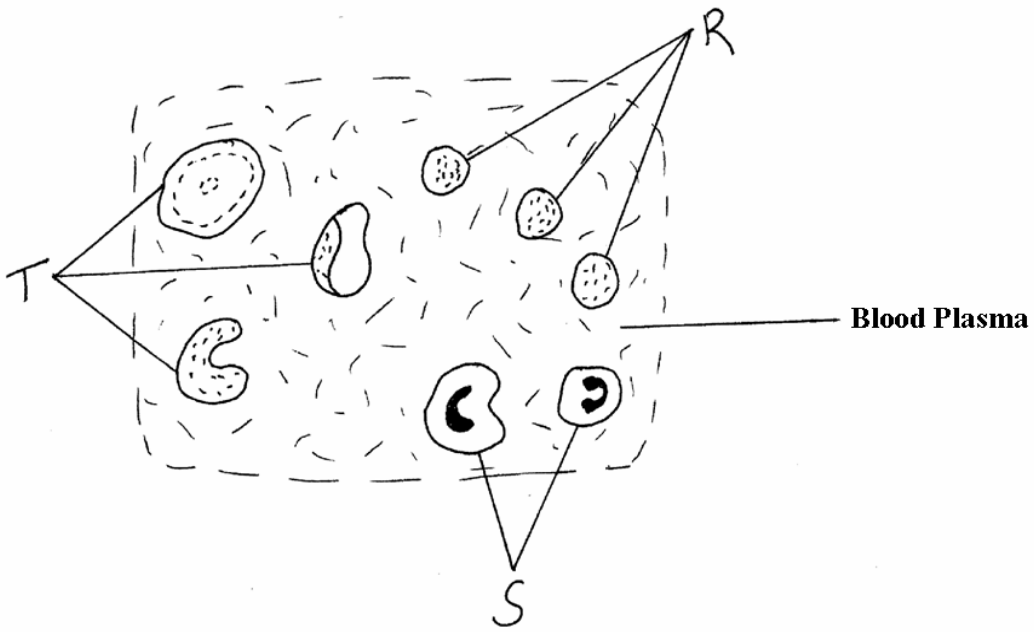
(d) Name **three** factors inside the seed that causes seed dormancy. (3mks)

……

……

……

The figures below represent mammalian tissue as seen under a light microscope.



(a) Identify the tissue (1 mk)

……

(b) Name the cells represented by (3 mks)

R

……

S

……

T

……

(c) State the function of structure S and R. (2 mks)

S

……

R

……

(d) Explain **two** adaptations of structure T to its function. (2 mks)

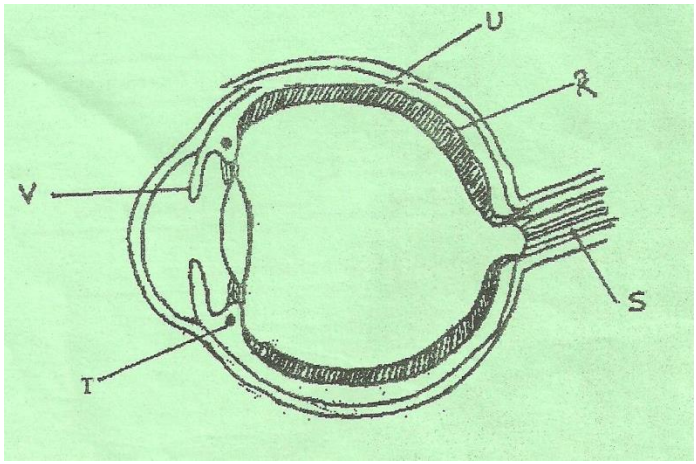
……

……

……

(e) Name the hereditary condition a person with structure T is suffering from. (1mk)

The diagram below shows a mammalian eye.



a) Name the parts labeled R, S and T. (3 mks)

R……

S……

T……

b) Give **two** adaptations of part labeled U. (2 mks)

……

……

……

……

c) Describe the changes that occur to part V when one moves from a bright room to a dark room. (3 mks)

……

……

……

……

……

……

……

SECTION B

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

6. Equal grams of maize flour were placed into two boxes K and L respectively. Equal numbers of weevils were then introduced into the boxes. The boxes were kept under similar environmental conditions. The weevils were counted at intervals and the results recorded in the table below.

No. of days after introduction of weevils	Approximate No. of weevils present	
	K	**L**
0	20	20
5	20	20
40	200	300
60	550	800
80	560	1300
100	650	1750
120	640	1750
135	650	1740
150	645	1748

a) Using a suitable scale and on the same axes draw two graphs of the approximate number of weevils present against number of days after introduction of weevils on the graph paper provided.
(8mks)

(b) What were the approximate number of weevils present in the two boxes on the 70th day? (2mks)

Number in **K:** ……..

Number in **L:** ….....

(c) (i) On what day was the population of weevils in **K** 580? (1mk)

.....

(ii) Between which days was the population difference greatest? (1mk)

.....

(d) Account for the shape of graph **L** between day 5 and day 100. (4 mks)

.....

.....

.....

(e) State factors that would make the human species assume the curve **K**above. (4mks)

.....

.....

.....

.....

7. (a) Explain the role of Auxins in geotropic response in plants (5 mks)

(b) Describe roles of **other** hormones in the growth and development of plants. (15 mks)

8. a) what is natural selection? (4mks)

b) Describe **four** evidences for organic evolution. (16mks)

PAPER 3

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

(a) Give the identity of each of the above bones. (4 marks)
(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.

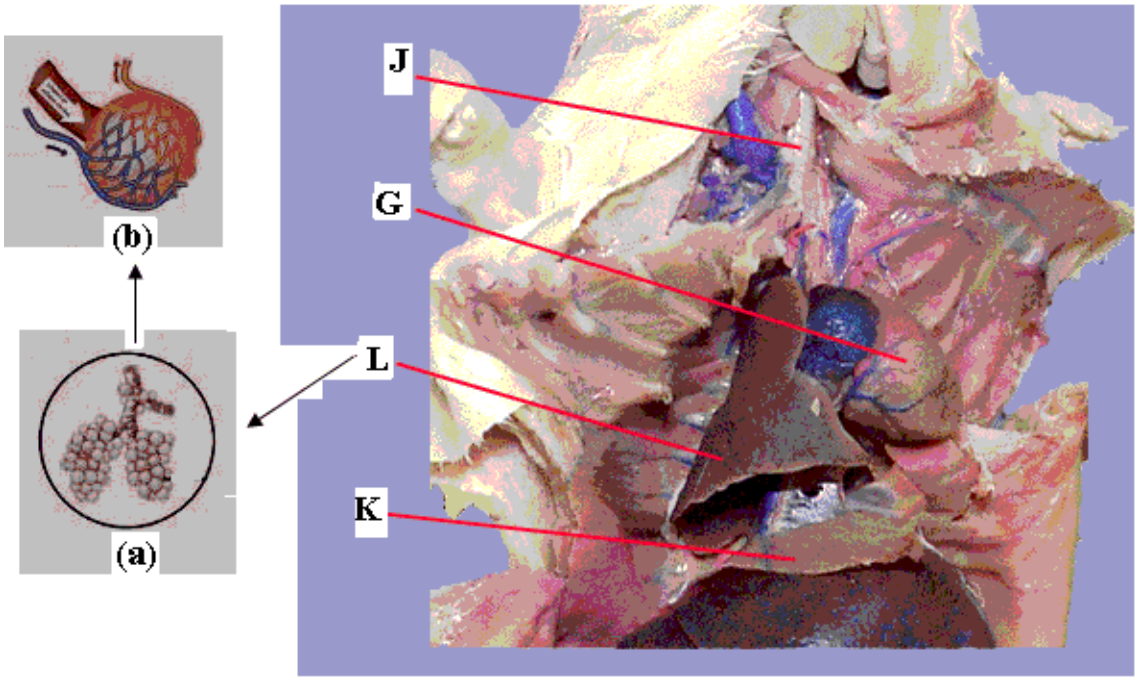
(a) Use the iodine solution to test for the food substance in solution **J**.
Food substance (1 mark)
Procedure (1 mark)
Observation (1 mark)
Conclusion (1 mark)

(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)