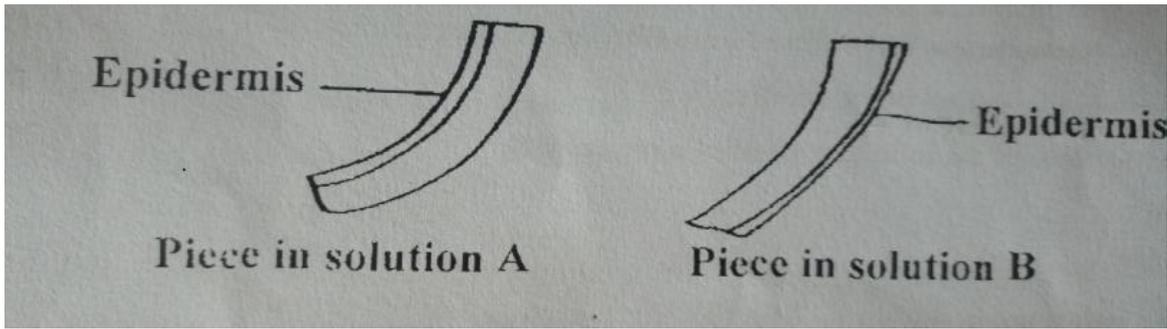


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6. A 4cm straight piece from a herbaceous plant was split lengthwise into two similar pieces. The pieces were placed in sugar solutions of different concentrations for 30 minutes. Their appearance after 30 minutes is as shown below.



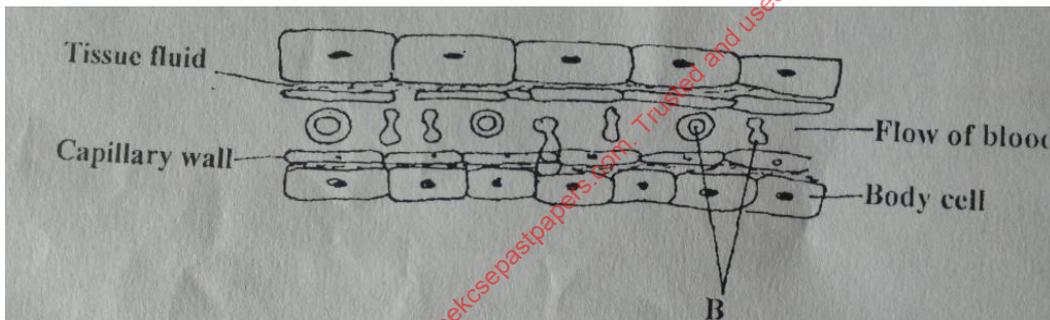
Account for appearance of the pieces in solution A and B.

(3mks)

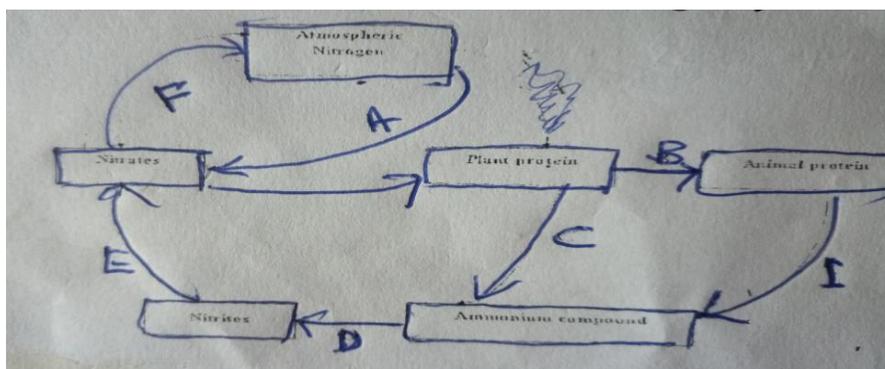
7. The equation below represents a process that takes place in plants. (1mk)



- i) Name the process. (1mk)
 - ii) State two factors not shown in the equation that are necessary for the process to take place. (2mks)
8. a) State two ways in which root hairs are adapted to their functions. (2mks)
- b) Explain how high humidity affects the rate of transpiration. (2mks)
9. The diagram below shows the exchange site between circulatory system and body cells.



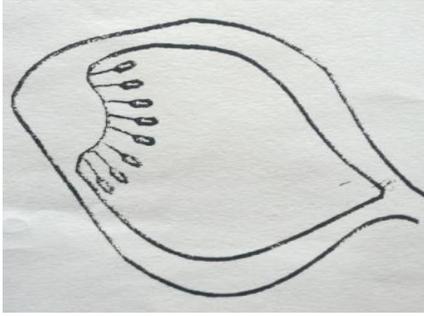
- i) Name the cells labelled B. (1mk)
 - ii) Name the gas that diffuses from B to the tissues cells. (1mk)
 - iii) Give two adaptations of the capillary wall. (2mks)
10. State the importance of the following parts of a microscope. (2mks)
- i) Clip
 - ii) Coarse adjustment knob
11. The diagram below represents a simplified Nitrogen cycle.



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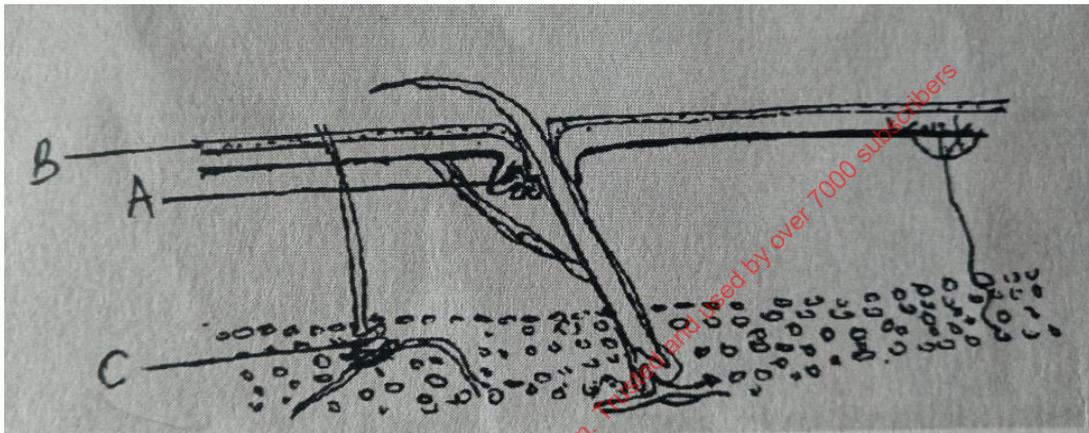
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28. a) Identify the type of placentation shown by the diagram below. (1mk)



b) Give two adaptation of a fruit dispersed by water. (2mks)

29. The diagram below represents a transverse section through human skin.



- a) Name the structure labeled A and B (2mks)
 - A –
 - B –
- b) State the function of the parts labeled C. (1mk)
- c) State two physiological changes that take place in a human skin in order to facilitate heat loss from the body. (2mks)

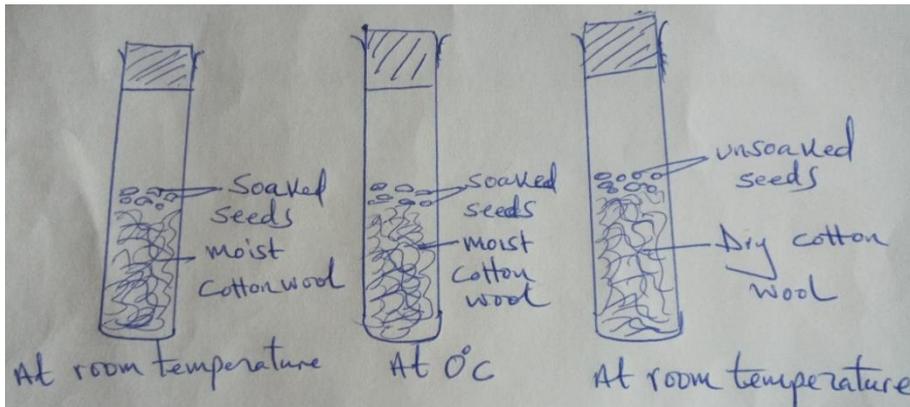
30. In what ways are fungal and plant cells similar. (2mks)

KIRINYAGA EAST
231/2
BIOLOGY THEORY
SECTION A – 40 MKS

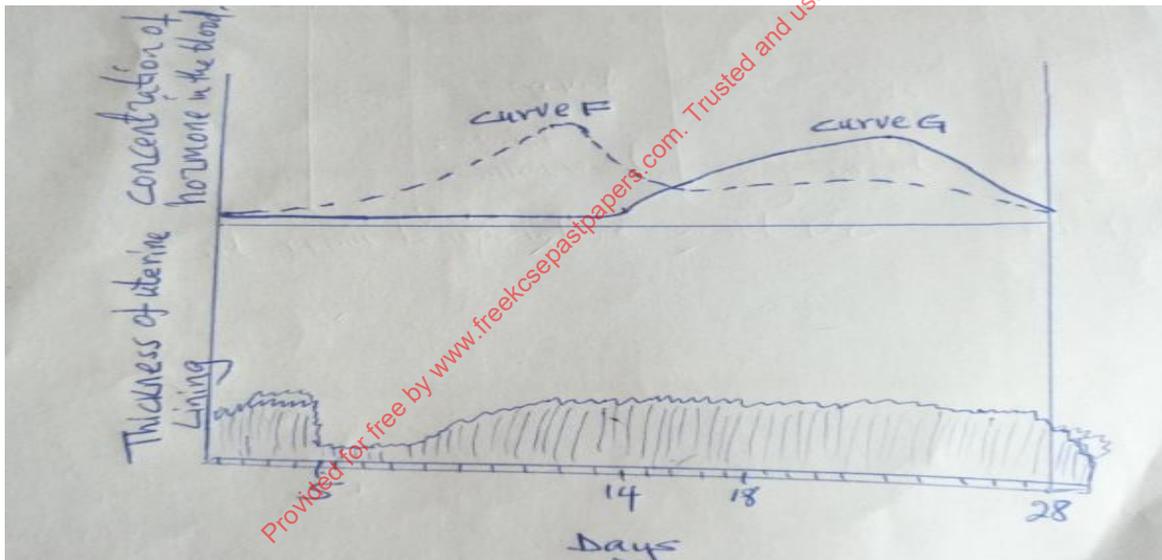
Answer all questions in the spaces provided.

1. In an experiment to investigate a factor affecting photosynthesis, a potted plant which had been kept in the dark overnight was treated as shown in the diagram below and exposed to light.
 - a) Why was the potted plant kept in the dark overnight? (1mk)
 - b) Which factor was being investigated in the experiment? (1mk)
 - c) i) Which test did the students perform to confirm photosynthesis in the leaves labeled P and Q? (1mk)
 - ii) State the results obtained in the leaves labelled P and Q. (2mks)
 - iii) Explain the results obtained in the leaves labelled P and Q. (2mks)
 - iv) What was the purpose of leaf Q in the experiment? (1mk)

2. The diagram below represents a set up to investigate the conditions necessary for seed germination. The set up was left for 7 days.



- What conditions were being investigated in the experiment? (2mks)
 - State three reasons for soaking seeds in set ups A and B. (3mks)
 - What were the expected results after seven days? (3mks)
3. The figure shows changes that take place during menstrual cycle in human.



- Name the hormone whose concentrations are represented by curves F and G. (2mks)
 - State the effects of the hormones named in (a) above on the lining of the uterus. (2mks)
 - Name the hormone which is released by the pituitary gland in high concentration on the 14th day of the menstrual cycle. (1mk)
 - State two functions of the hormone named in (c) (i) above. (2mks)
 - State the fertile period during the menstrual cycle. (1mk)
4. When pure breeding black guinea pigs were crossed with pure breeding white guinea pigs, the offspring had a coat with black and white patches.
- Using letter G to represent the gene for black coat colour and letter H for white coat colour, work out the genotypic ratio of F₂. (5mks)
 - State the phenotypic ratio of F₂. (1mk)
 - Name the term used when two alleles in heterozygous state are fully expressed phenotypically in an organism. (1mk)

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**KIRINYAGA EAST
BIOLOGY
CONFIDENTIAL**

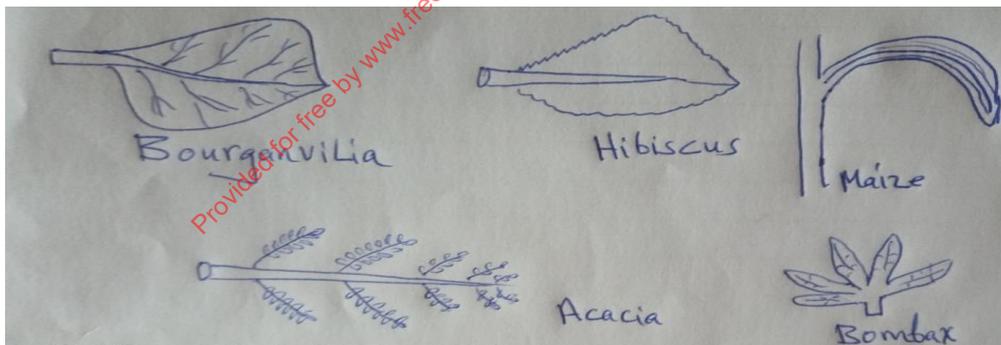
1. Oranges (1 per student) (Specimen R)
2. Boiling tube 1 per student
3. 3 test tubes per student
4. Source of heat
5. Test tube rack 1 per student
6. Test tube holder 1 per student
7. Benedict's solution with a dropper
8. DCPIP with a dropper
9. Scalpel
10. Dropper 1 per student

KIRINYAGA EAST STRATEGIC ALLIANCE EXAMINATION

231/3

BIOLOGY PRACTICAL

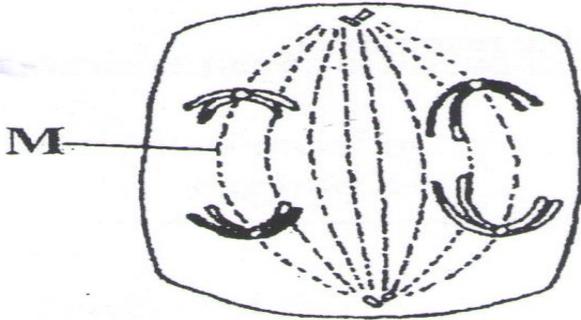
- 1 A). you are provided with specimen R. Examine it and answer the questions that follow.
 - a) State whether the specimen is a fruit or a seed. Give a reason. (3mks)
 - b) Using a scalpel, make a transverse section of specimen R; make a large well labelled diagram of the section. (6mks)
 - c) With a reason state the type of fruit and method of dispersal for specimen R. (4mks)
 - Fruit type
 - Reason
 - Method of dispersal
 - reason
- B. Squeeze the juice of specimen R into a boiling tube. Using the reagents provided, test the food substance present in the juice. (6mks)
- 2 A) i) The diagrams below shows leaves obtained from five different plants. Using the observable features given below, construct a dichotomous key and identify the leaves in the drawings above. (8mks)



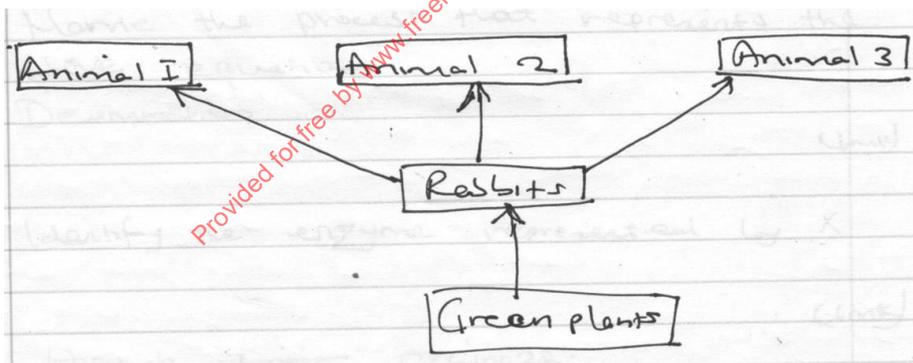
- i) Leaf type
 - ii) Type of venation
 - iii) Type of margin
 - iv) Leaflets attachment to the stalk.
- ii) Classify the maize into (4mks)
- Kingdom: _____
- Division: _____
- Sub-division: _____
- Class: _____

TRIAL 1 2019
BIOLOGY
FORM IV PAPER
1

1. Name the part of a flower that develops into:
 - a) Seed [1mk]
 - b) Fruit [1mk]
2. State two ways in which floating leaves of aquatic plants are adapted to gaseous exchange. [2mk]
3. The diagram below represents a stage during cell division



- a. [i] Identify the stage of cell division [1mk]
 - ii) Give two reasons for your answer in [a] [i] above [2mk]
- b) Name the structures labeled M [1mk]
- c) Name the class to which millipede belongs [1mk]
4. [a] Distinguish between the terms Homodont and heterodont [2mk]
 - b) what is the function of the carnassial teeth [2mk]
5. An A blood group patient involved in a road accident required an urgent blood transfusion. His relatives were invited to donate blood.
 - a. Name the possible relative who would not donate blood to him [2mk]
 - b. State why the others would not be in a position to donate blood to him [2mk]
6. The flow chart shows a part of a food relationship in an ecosystem

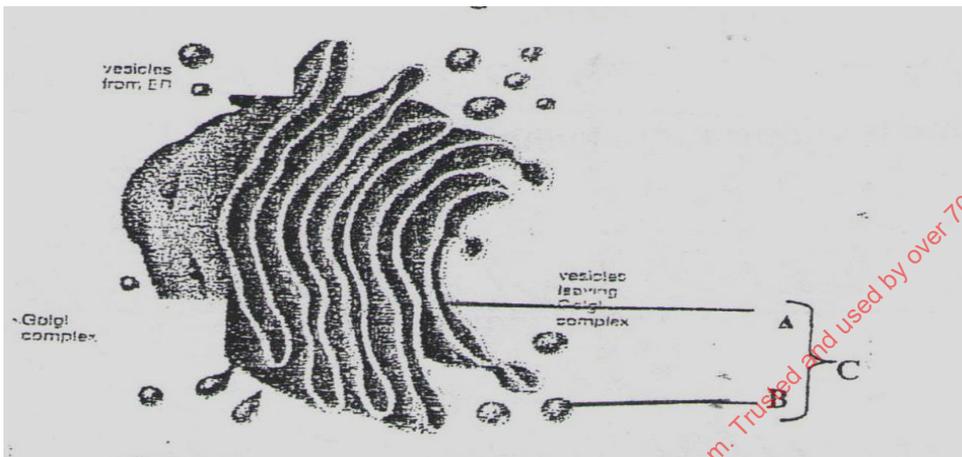


- a. Name the food relationship shown (1mk)
 - How many trophic levels are shown in the diagram [1mk]
- b. What is the main source of energy in the ecosystem [1mk]
7. Name the only epidermal cell in plants that contain chloroplast [1mk]
8. The equation below represents a metabolic process that occurs in the mammalian liver

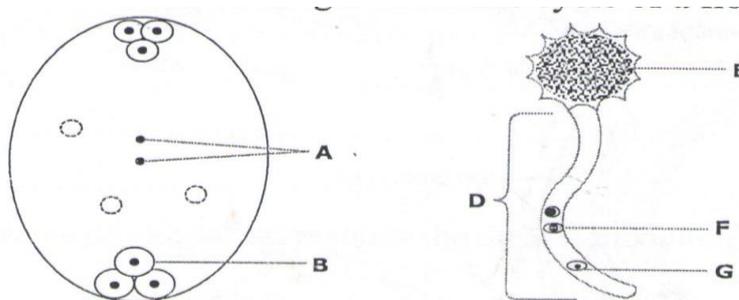
Amino Acids Enzyme \xrightarrow{x} organic compound

 - a. Name the process that represents the above equation [1mk]
 - b. Identify the enzyme represented by x [1mk]
 - c. What is the importance of the process to the mammal [1mk]

9. [a] Name the carbohydrate that is stored in mammalian muscle [1mk]
 b. What name is used to describe removal of indigestible and undigested food material from the alimentary canal [1mk]
10. [a] Carl Linnaeus developed the taxonomic units of classification
 i) What is taxonomy [1mk]
 ii) Why was the system of classification by Carl Linnaeus described as natural system of classification [2mk]
11. Phagocytes also called granulocytes or polymorphs are cells found in the blood whose they ingest pathogens and cell debris
 i) Why are they called polymorphs. [1mk]
 ii) Name the cell organelle most abundant in phagocytes to enable them function effectively [1mk]
12. Name the:
 [a] Material that strengthens xylem tissue [1mk]
 [b] Tissue that is removed when the part of a plant is ringed [1mk]
13. The diagram below represents a cell organelle.



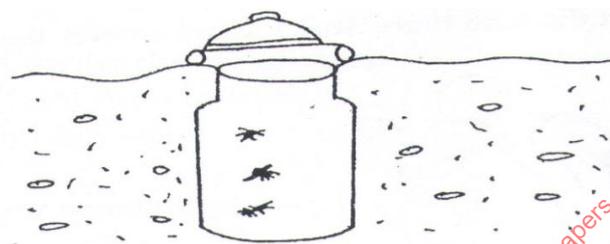
- i. State the function of this organelle [1mk]
 ii. Name each of the parts A and B [1mk]
14. In which two ways do guard cells differ from other epidermal cells [2mk]
15. Through cellular respiration, the chemical energy stored in glucose molecule is converted into which specific molecule [3mk]
 b. Name the substance that speed up chemical reaction without being used up in those reactions
16. During germination and early growth, the dry weight of endosperm decreases while that of embryo increase explain [2mk]
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 [4mk]

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

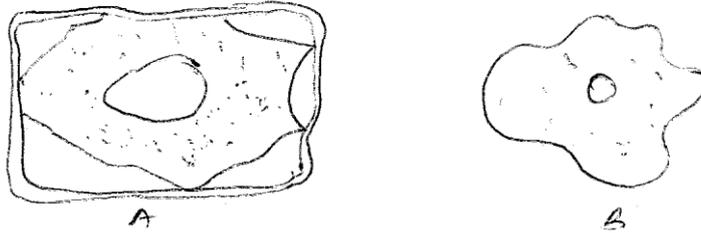
18. [a]. State 2 characteristics of kingdom Monera that are not found in other kingdoms [2mk]
19. State three ways by which plants compensate for lack of the ability to move from one place to another [3mk]
20. State three physiological processes that are involved in movements of substances across the cell membrane [3mk]
21. If the human pancreas is not functional:
- Name the hormone which will be deficient [1mk]
 - Name the disease the human is likely to suffer from [1mk]
21. The oxidation state of a certain food is represented below by a chemical equation
- $$2C_3H_2O_2N + 6O_2 \rightarrow (NH_4)_2CO_2 + 5CO_2 + 5H_2O$$
- Calculate the respiratory quotient [RQ] of the food substance [2mk]
 - Identify the food substrate [1mk]
22. The diagram below shows an apparatus used during collection of specimen



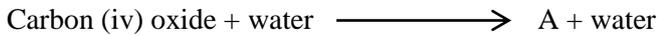
- Identify the apparatus [1mk]
 - What is the use of the apparatus named above [1mk]
24. State two factors in an ecosystem that affect the distribution of organisms [2mks]
25. A DNA strand has the following base sequence G C C T A G A T C A C
What is the sequence of the
- Complementary DNA strand [1mk]
 - M-RNA strand copied from this DNA strand [1mk]
26. State three limitations of fossil records as evidence of organic evolution [3mk]
27. How does nutrition as a characteristic of living organism differ in plants and animals [2mk]
- Body tube [1mk]
 - Diaphragm [1mk]
28. State three characteristics of gaseous exchange surfaces [3mk]
29. State two sources of variations [2mk]

**TRIAL 1
BIOLOGY
PAPER II
TERM II, 2019**

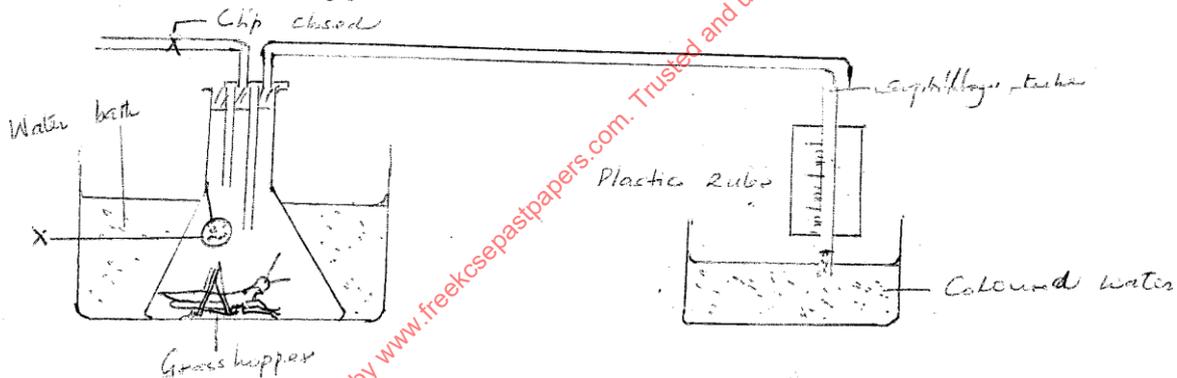
1. The diagram shows two types of cells placed in a certain solution. Study them and answer questions that follow



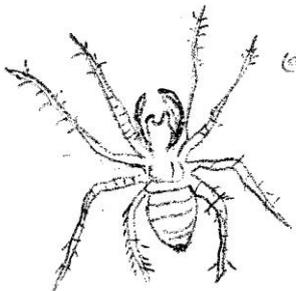
- a. Name the physiological process responsible for the observed results. [1 Mark]
 - b. Give the correct biological term used to describe cells A & B. [2 Marks]
2. The equation below shows a chemical reaction that takes place in plants.



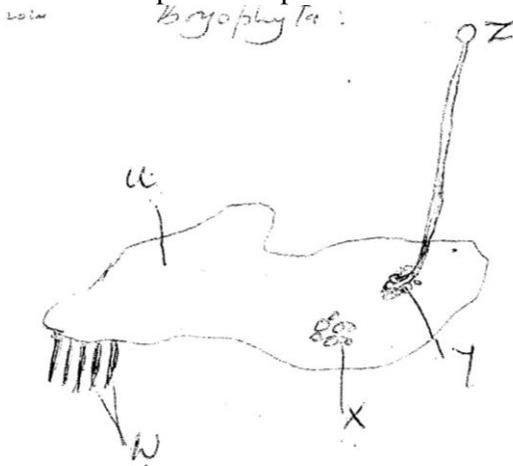
- a. Identify substance A. [1 Mark]
 - b. Name the process represented by the equation. [1 Mark]
 - c. Other than the reactants state **two** conditions necessary for this reaction. [2 Marks]
3. The diagram below illustrates an experiment used to determine rate of respiration in a small insect.



- a. Name the chemical compound labeled X and state its function. [2 Marks]
Compound –
Function –
 - b. Why is the conical flask placed in a water bath? [1 Mark]
 - c. What would happen to the level of coloured water after 5 minutes? Explain: [2 Marks]
 - d. How can a control experiment be set? [1 Mark]
4. In a biology lesson a student collected the animal in the diagram below. Use it to answer questions that follow;



- a. Name the phylum and class to which the organism belongs
 i) Phylum _____ [1 Mark]
 ii) Class _____ [1 Mark]
- b. Give two reasons for your answer in 1 (i), (ii) above [4 Marks]
5. The diagram below represents a plant in the division Byrophyta:



- a. Name the parts labeled [5 Marks]
 b. Name one function of part labeled. [3 Marks]
- 6.
- a. It is observed that when apical bud of a plant is removed, lateral buds sprout, where as they do not sprout in presence of the apical bud;
 i) What is the biological term used to describe this? [1 Mark]
 ii) Give one application of this phenomena in agriculture. [1 Mark]
- b. State four roles of IAA in plant growth and development: [4 Marks]
- c. In epigeal germination the cotyledon is brought above the soil surfaces; Explain [2 Mark]
- 7.
- a. State 2 structural modifications of nephrons in desert mammals. [2 Marks]
 b. State a kidney disease whose symptom is coloured and turbid urine [1 Mark]
8. In a biological experiment; a cross was made between a tall pea plant & dwarfs plants; their progeny was selfed and the resulting plants were in a mixture in the ratio of 3:1. Make a biological cross to show these outcomes. [4 Marks]
9. Explain geographical distribution as evidence of organic evolution. [2 Marks]

SECTION B

Answer Questions 10 (Compulsory) and either question 11 or 12 in the Spaces Provided

10. The table below shows the changes observed in the dry weight in milligrams of a barley seedling, its embryo and Endosperm during the first ten days after the onset of germination.

Time (days)	Dry weight in milligrams		
	Embryo	Endosperm	Whole seedling
0	2	41	45
2	2	39	43
4	7	32	41
6	15	21	38
8	22	11	35
10	35	6	43

- a. Using a suitable scale and on the same axis, plot a graph of dry weight of embryo, endosperm and whole seedling against time. [8 Marks]

- b. State and account for the changes in dry weight shown by:-
- Endosperm [4 Marks]
 - Embryo [4 Marks]
- c. Explain the role of water during germination [4 Marks]
- 11.
- Describe how the mammalian heart is adapted to its function [10 Marks]
 - How does gaseous exchange take place in terrestrial plants? [10 Marks]
- 12.
- How is the Epidermis of a green plant adapted to its function? [6 Marks]
 - Describe how structural factors affect rate of transpiration in plants [8 Marks]
 - Describe how xerophytes adapted to minimize water loss in their habitat. [6 Marks]

TRIAL 1
BIOLOGY PAPER III
TERM II, 2019

Paper 231/3.(Practical).

CONFIDENTIAL INSTRUCTIONS:

NB/Requirement instruments:

- About 10ml of substance L.
- 4 clean test tubes on a rack.
- A means of heating
- Test tube holder.
- A scalpel.
- A house fly labeled specimen M.
- A dry bean seed labeled S₁.
- A bean seedling labeled S₂.
- A maize seedling labeled S₃.
- 1% copper (II) sulphate solution.
- 10% sodium hydroxide solution.
- Benedict's solution.
- Iodine solution.

Note:

- To make substance L, mix egg albumen and starch.
- Specimen S₂ and S₃ should be ready 1 week before the exams and must have the seeds intact.

**TRIAL 1
BIOLOGY
PAPER III (PRACTICAL)**

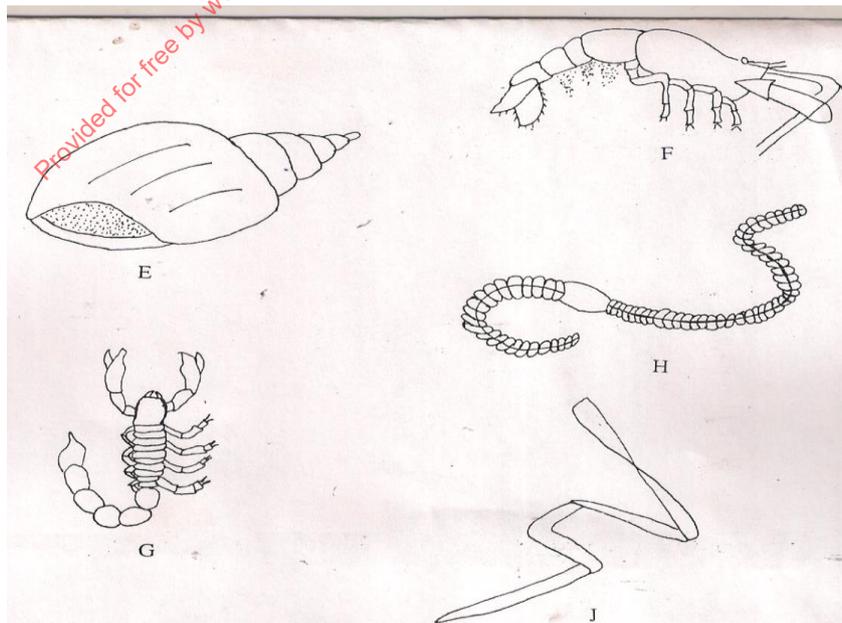
Answer all the questions in the spaces provided.

1. You are provided with substance L. Carry out food tests on the substance using the reagents provided. Record your procedure, observations and conclusions in the table below. (9mks)
2. During a visit to a museum, students were shown ten specimens of organisms on display. The teacher provided a dichotomous key (shown in a separate page) to enable them to place each species on display into its taxonomic group. Five of the specimens that were on display are shown in the diagrams provided.

Dichotomous Key.

- | | |
|---|-------------|
| i. a) Animal with a flattened body..... | go to 9. |
| (b) Animal without a flattened body..... | go to 2. |
| 2. (a) Animal with body in a shell | Mollusca. |
| (b) Animal with body in shell..... | go to 3. |
| 3. (a) Animal with segmented body..... | go to 4. |
| (b) Animal with body not segmented..... | Nematoda. |
| 4. (a) Animal with jointed appendages go to 6. | |
| (b) Animal without jointed appendages to 5. | |
| 4. (a) Animal with long and cylindrical body..... | annelida. |
| (b) Animal with short stout body..... | Trenada. |
| 5. Animal with antennae..... | go to 7. |
| (b) Animal without antennae | go to 8. |
| 6. (a) Animal with one pair of antennae..... | Insecta. |
| (b) Animal with more than one pair of antennae..... | crustacean. |
| 7. (a) Animal with pincer –like mouthparts..... | Arachida. |
| (b) Animal with sucking mouth parts..... | Acarina. |
| 8. (a) Animal with long ribbon-like body | cestoda. |
| (b) Animal with circular body..... | rinoidea). |

Use the dichotomous key to identify the taxonomic group of each of the five specimens shown in the drawings.



In each case, show in sequence the steps (ef 1a,2a,5a, 7b) in the key that you followed to arrive at the identify of each specimen. (5mks)

Animal	Steps followed	Identity
E		
F		
G		
H		
J		

b) i) Nam the phylum and the class to which specimen M belongs (2mks)
 Phylum:
 Class:

ii) Name the observation features that enabled you to place it in the class above. (3mks)

c) With the help of a hand lens, examine the body of specimen M.

i) State with a reason in each case he observable features that enable the specimen to be a disease vector. (2mks)

ii) Name one disease transmitted by specimen M. (1mk)

iii) State two methods that can be used to prevent specimen M from spreading diseases. (2mks)

3 You are provided with specimens labeled S₁ S₂ and S₃

a. Using a scarpel blade split S₁ longitudinally and draw a well labeled diagram to show the internal structures. State your magnification (4mks)

b. With a reason ,state the class to which the plant from specimen S₁ belongs to.

Class (1mk)

Reason (1mk)

c. Specimen S₂ is a germinated seedling of S₁.In the table below, name three structures and say which structure in S₁ developed into the structure in S₂.

Structure in S ₁	Structure in S ₂

d. (i) Using specimens S₁ and S₃ ,name the type of germination in :-

S₁

S₃

(1mk)

ii. Give the difference between the this type of germination in (d) (i) above (2mks)

iii. Account for the type of germination in :-

S₁

S₃

2mks

(2mks)

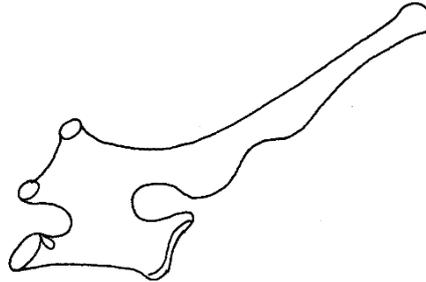
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KIGUMO
231/1
BIOLOGY
FORM 4

JULY 2019

ATTEMPT ALL THE QUESTIONS

1. Some form one students wanted to collect the following animals for study in the laboratory. State the suitable apparatus they should use.
 - a) Housefly (1 mark)
 - b) Scorpion (1 mark)
 - c) Ants (1 mark)
2. The diagram below represents a mammalian vertebra.



- a. Identify the vertebra represented above. (1mk)
- b. Give a reason for your answer. (1mk)
3. (a) Explain the role of oxygen in Active transport (1mk)
 (b) Name two processes that depend on Active transport in animals (2mks)
4. Explain how sunken stomata lower the rate of transpiration (2mks)
5. State how xylem vessel is adapted to its function (3mks)
6. a) Define the term immunity. (1mk)
 b. Distinguish between natural immunity and acquired immunity. (1mk)
 c. Identify one immunizable disease in Kenya. (1mk)
7. State two adaptations of the alveolus to its functions. (2mks)
 (a) Why may an asthmatic patient produce a wheezing sound during breathing? (1mk)
 (b) What is the significance of the cartilage found in the human trachea being incomplete (c- shaped rings) (1mk)
8. Define the following terms;
 - (i) Inter specific competition. (1mk)
 - (ii) Carrying capacity (1mk)
9. Suggest two methods that can be used to determine the type of food eaten by animals. (2mks)
10. (a) State one significance of genetics counseling (1mk)
 (b) Part of a strand of DNA molecules was found to have the following sequence A-T-C-G-G-G-A-T-C-T. What is the sequence?
 - i. Of the complementary strand? (1mk)
 - ii. On a m- RNA strand copied (1mk)
11. The paddles of whales and the fins of fish adapt these organisms to aquatic habitats.
 - (a) Name the evolutionary process that may have given rise to these structures. (1mk)
 - (b) What is the name given to such structures? (1mk)
 - (c) Give two examples of vestigial organs in man. (2mk)

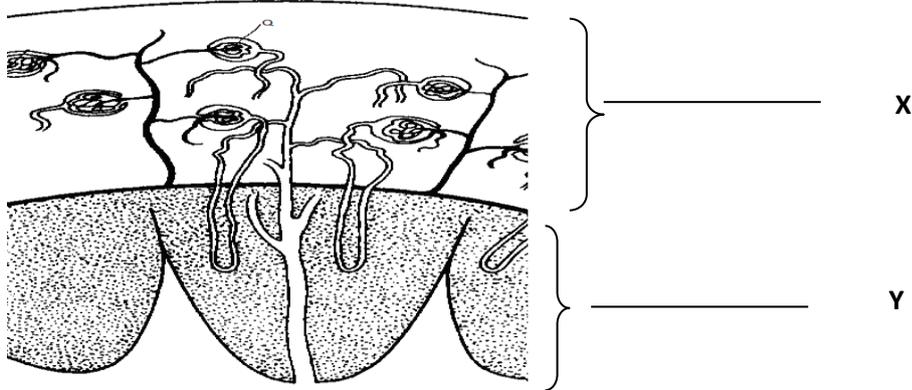
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Auxin concentration (ppm)

(a) Identify conclusions that can be drawn from the graph.

(3mks)

16. The illustration below shows a transverse section through a mammalian kidney.



(a) Name the structures labelled X and Y.

(b) State the process in Q that leads to the formation of glomerular filtrate.

(1mk)

17. State **three** differences in composition between umbilical artery and umbilical vein.

(3 marks)

Umbilical vein	Umbilical artery

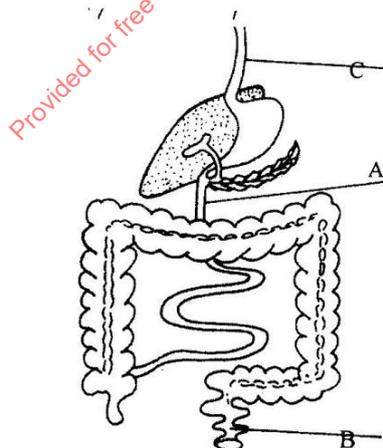
18. (a) What is meant by the term taxonomy?

(1mk)

(b) When are two organisms considered to belong to the same species.

(2mks)

19. The diagram below shows part of alimentary canal of a mammal



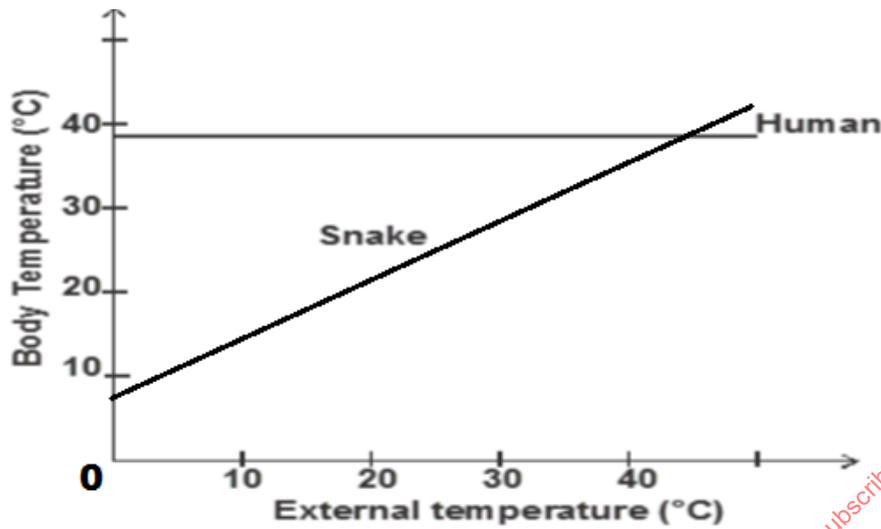
(i) Name the parts labeled A and C

(2mks)

(ii) State the function of the part labeled B

(1mk)

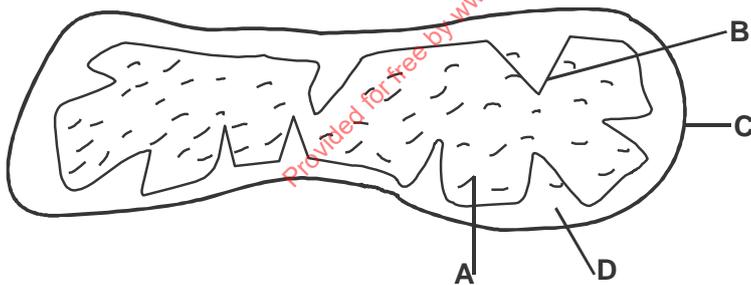
20. The graph below shows the relationship between body temperatures and external temperatures in a human being and a snake. Study it and answer questions that follow.



- a) What happens to the temperature of each organism as the external temperature increases. (2 marks)
 Human —.....
 Snake —.....
- b) Humans are described as homoithermic. State the advantage of this condition. (2marks)
21. a) Name two products of light stage during photosynthesis. (2 marks)
 b) State three differences between light stage and dark stage of photosynthesis. (3 marks)

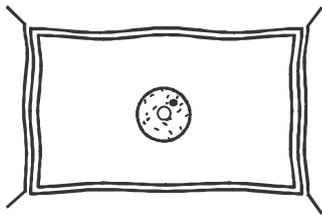
Light	Dark

22. The diagram below represents a cell organelle.

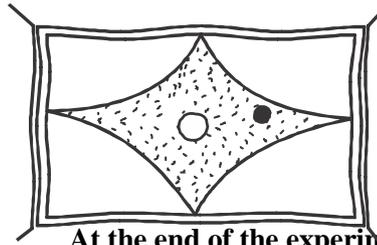


- a) Identify the organelle. (1 mark)
 b) Name the part labelled B (1 mark)
 c) State the functions of the part labelled A (1 mark)

23. The diagram below represents a plant cell that was subjected to a certain treatment.

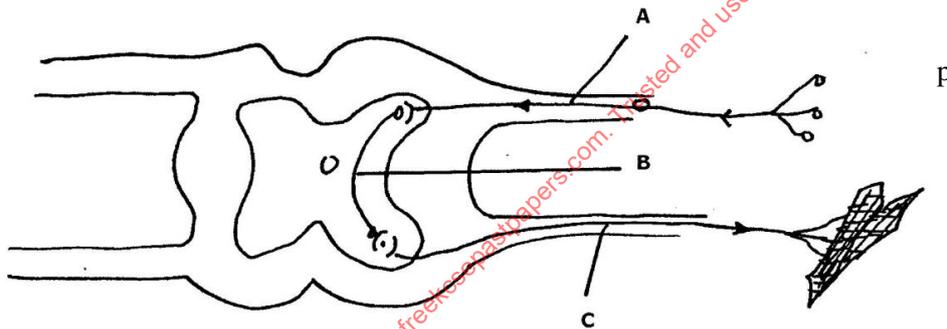


At the start



At the end of the experiment

- a) Account for the shape of the cell at the end of the experiment. (2 marks)
 - b) Draw a diagram to illustrate how an animal cell would appear if subjected to the same treatment. (1 mark)
24. a) Give a reason why each of the following steps are followed when preparing cross sections of a leaf for examination under a microscope.
- a) Cutting thin sections. (1 mark)
 - b) Placing the sections in water. (1 mark)
25. a) Name two tissues in plants that provide mechanical support. (2 marks)
- b. Name the types of joints formed by each of the following pairs of bones:
- i) Axis and atlas. (1 mark)
 - ii) Humerus with clavicle and scapula. (1mk)
26. The diagram below represents a simple reflex arc



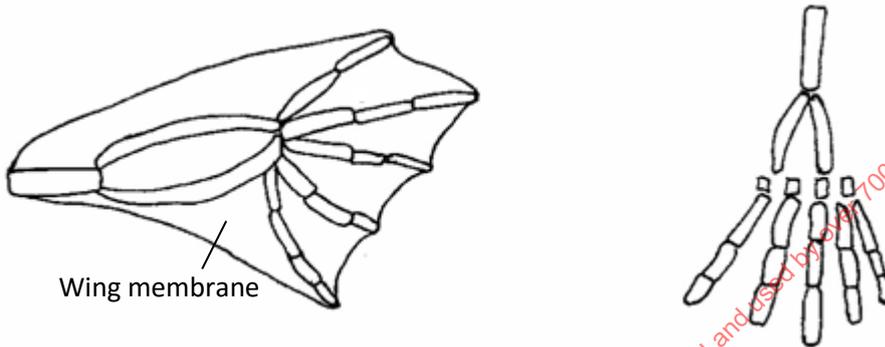
- (a) Name the parts labeled A, B and C (3mks)
- (b) What is the role of part A (1mk)

KIGUMO
231/2
BIOLOGY
PAPER 2 (THEORY)

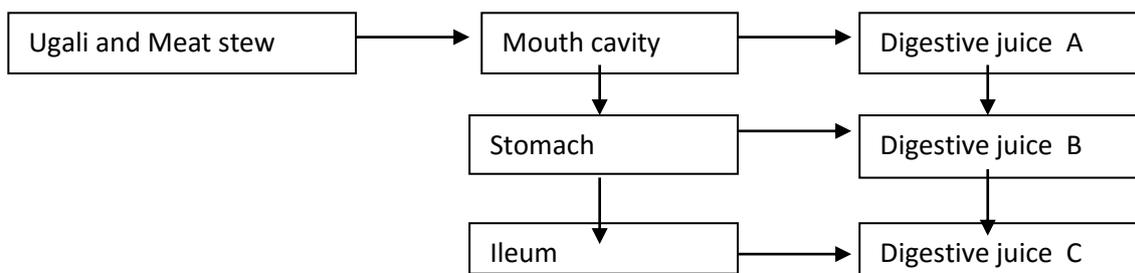
SECTION A (40 MARKS)

Answer all questions in this section in the spaces provided.

4. (a) Name **two** disorders in human caused by gene mutation. (2 marks)
 (b) Describe the following chromosomal mutations:
 (i) Inversion (1 marks)
 (ii) Translocation (1 marks)
 (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 working. Use letter **B** to represent the allele for **black colour**. (4 marks)
5. The diagram **below** shows structures of the bat wing and human arm.

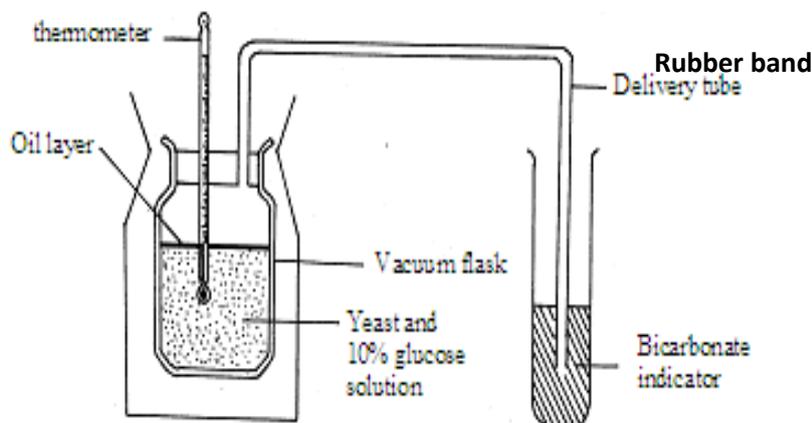


- (a) These structures are thought to have same ancestral origin. State **one** structural similarity and **one** adaptational difference between the two.
 (i) Structural similarity. (1mk)
 (ii) Adaptation difference. (2mks)
- (b) Give **two** other examples of structures in nature that show the type of evolution as in (a) above. (2mks)
- (c) Distinguish between the terms 'chemical evolution' and 'organic evolution'. (2mks)
- (d) What is the study of fossils called? (1mk)
3. a) Name the causative agents for the following respiratory diseases.
 i. Whooping cough..... (1 mark)
 ii. Pneumonia..... (1 mark)
- b) Describe how carbon (IV) oxide in the tissues reaches the lungs (4 marks)
- c) How are guard cells adapted to their functions? (2mks)
4. The flow diagram below represents passage of a meal through the human digestive system. Study the diagram and answer the questions that follow.



- (a) Name the physical process that will occur in mouth cavity (1mark)
 (b) Name the digestive juices **B** and **C** (2 marks)

- (c) Explain **two** ways in which the digestive system is protected from corrosive effects of digestive juices. (2 marks)
- (d) Name the hormone that stimulate secretion of juice **B**. (1mark)
- (e) Identify **two** contents of digestive juice **A** (2 marks)
5. The experiment below was set-up to investigate some physiological processes. The glucose solution was first boiled then cooled. The set-up was left for 24hrs.



- (a) Suggest two aims of the experiment. (2mks)
- (b) (i) State the expected observations after 24 hours. (2mks)
- (ii) Explain your observations in a (i) above. (2mk)
- (iii) Why was glucose solution boiled then cooled? (1mk)
- (iv) Suggest a control for the above experiment (1mk)

SECTION B (40 MARKS)

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

6. In an experiment, a man drank one litre of water and the volume of urine produced was measured and recorded at an interval of one hour after drinking the water. On the second day, the man repeated the experiment but this time he drank one litre of 1.2% sodium chloride solution. The results are as shown in the table below:

Time (hours)	Volume of urine produced (cm ³) on drinking	
	Water	1.2 % sodium chloride solution
0	80	30
1	50	30
2	350	40
3	540	35
4	30	60
5	100	40
6	50	80
7	70	100

- (a) On the same axes, plot graphs of urine produced on drinking water and 1.2% sodium chloride solution against time. (8 marks)
- (b) From the graph, determine the volume of urine produced by the man two and a half hours after drinking water. (1 mark)
- (c) Account for the production of urine produced by the man when he drank the litre of
- (i) 1.2% sodium chloride solution. (3 marks)
- (ii) Water (3marks)
- (d) What is diabetes insipidus? (2 marks)
- (e) Explain why treatment of diabetes mellitus is via injection and not through taking insulin tablets orally. (2 marks)
7. Explain how abiotic factors affect plants in their habitat. (20 marks)

8. Describe the structure and function of various parts of the heart

(20 marks)

KIGUMO
BIOLOGY CONFIDENTIAL REPORT
INSTRUCTIONS TO SCHOOLS

The information contained in this paper is to enable the head of the school and the teacher in charge of biology to make adequate preparations for the biology practical examination.

NO ONE ELSE should have access to this paper or acquire knowledge of its contents

- Ripe sweet banana labeled specimen T
- Scalpel
- Hand lens
- Stirring rod
- Four test tubes in a rack
- Test tube holder

Access to:-

- Benedicts Solution
- Sodium Hydroxide Solution
- DCPIP Solution
- Copper (II) Sulphate Solution
- Means of Heating

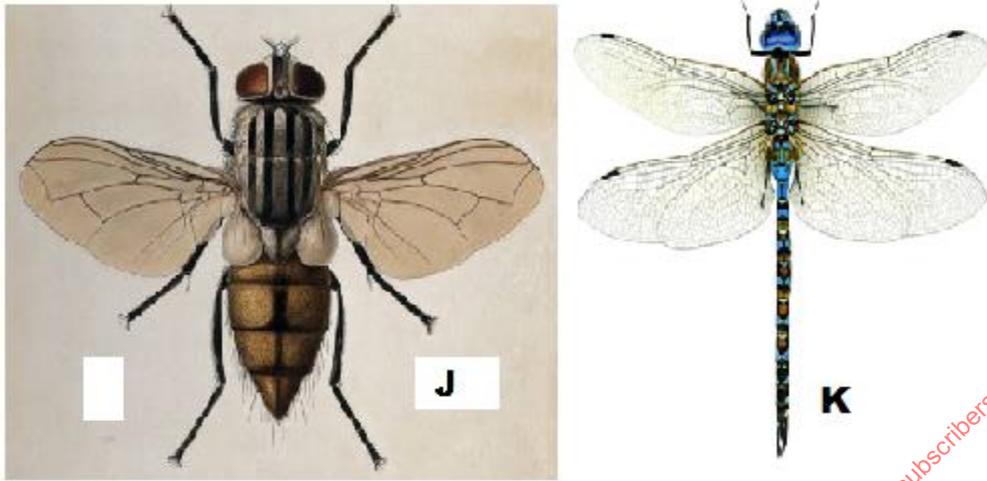
KIGUMO
231/3
BIOLOGY
PAPER 3
JULY 2019

1. You are provided with a specimen labeled T which is a fruit. Use it to answer the questions that follow.
- a) Make a transverse section of the specimen T. Draw and label at least 3 parts. (Save the specimen for use in question 2) (5mks)
 - b) With reasons, state the identity of fruit T.
 - Type of fruit..... 1mk
 - Reason 1mk
 - c) Suggest the possible agent of dispersal and give **two** reasons
 - Agent 1mk
 - Reason 2mk
 - d) What is the placentation of T? 1mk
 - e) Specimen T was green in colour before it was treated with a plant hormone. Suggest the plant hormone. 1mk
2. (a) Crush a piece of the specimen T in a test tube using a stirring rod, add some water and shake. Decant into another test tube. Use the reagents available to establish the food substances present in specimen T extract by filling in the table below.. 9mks

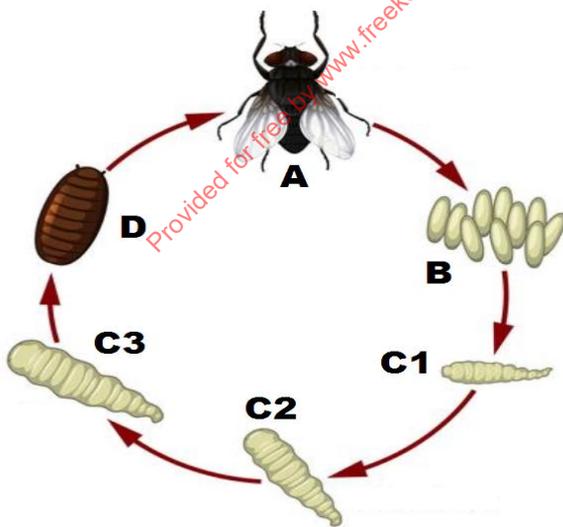
FOOD	PROCEDURE	OBSERVATIONS	CONCLUSION
------	-----------	--------------	------------

- (b) Identify one type of organic substance absent in T. (1mk)

- (c) Based on the tests you have carried out above, give one reasons why consuming a lot of T may be unsuitable to a diabetic person. (2mks)
- (d) How can you show that somebody is diabetic in the school laboratory? (2mks)
3. Below are photographs of two specimens, J and K. Both of them belong to the same phylum and class. Observe them carefully before you answer the questions that follow.



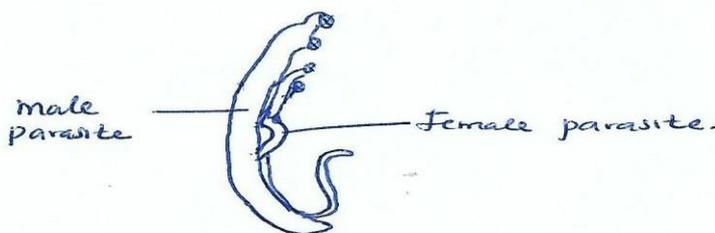
- a) Name the class to which J and K belong and support your answer with two reasons. (1mk)
 Class (2mks)
 Reasons (2mks)
- b) Suggest why the circulatory fluid in J and K has no haemoglobin. (2mks)
- c) Observe their wings and suggest the type of evolution that could have taken place to give rise to J and K, and then give a reason for your answer. (1mk)
 Type of evolution (2mks)
 Reason
- d) Below is a diagram showing the life cycle of specimen J.



- i) Identify the stage labeled D. (1mk)
- ii) Name the hormone responsible for the change from D to A. (1mk)
- iii) Explain the differences in the change from C2 to C3 and from C3 to D. (4mks)

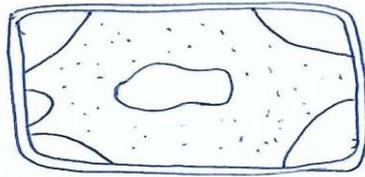
GATUNDU SOUTH EVALUATION EXAMINATION**BIOLOGY 231/1****(Theory)****JULY 2019****2 hours**

1. Name the class to which the following organisms belong. [2mks]
 - i) Spider
 - ii) Bean plant
2. Give a reason why coarse adjustment knob should not be used when viewing with high power objective lens. [1 mk]
3. a) State **two** functions of an electron microscope. (2 marks)
- b) A Student was examining cells from an unidentified rabbit organ under an electron microscope and found that most cells are rich in rough endoplasmic reticulum and golgi bodies .What conclusion can you make concerning the organ . [2mks]
4. A student dropped a small piece of fresh liver in a beaker containing hydrogen peroxide. A lot of fizzling and frothing was observed.
 - a. Name the gas produced. [1mk]
 - b. Write the word equation for the reaction above. [1mk]
5. Compare the composition of blood in umbilical artery and umbilical vein. [2mks]
6. Give a reason why pre mature baldness tuft of hair in the nose and ear are characteristics found in males only. [1mk]
7. Distinguish between osmotic pressure and osmotic potential. [2mks]
8. State **two** ways in which one can investigate the rate of transpiration in plants. [2mks]
9. What is the effect of eating a meal with too much salt to urine production in human. [2mks]
10. a) Name the blood vessel that links arterioles with venules. [1mk]
- b) State **two** ways in which the blood vessel named in [a]above is adapted to its functions. [2mks]
11. (i) What is a dichotomous key? (1 mark)
- (ii) State **two** characteristics of class Arachnida. (2 marks)
12. Outline **two** physiological conditions that may increase energy required per day in a woman. [2mks]
13. Tongue rolling is dominant over the inability to roll the tongue. In a family both the father and mother can roll their tongue of their two children one is a roller and the other is a non-roller. Use letter R to represent the tongue rolling gene.
 - a) Write the possible genotypes of. [3mks]
 - i) Father
 - ii) mother
 - iii) Non –roller child
 - b) Name the type of variation exhibited in the above case. [1mk]
14. Distinguish between the terms protandry and protogyny as used in reproduction in plants.
15. A person of blood group A cannot receive blood from a person of blood group B. Explain. [2mks]
16. State **two** most significant factors that favour exponential growth of a population in any given habitat.
17. State **two** economic importance of bacteria in nature. (2 marks)
18. A patient blood was found to have the parasite below:

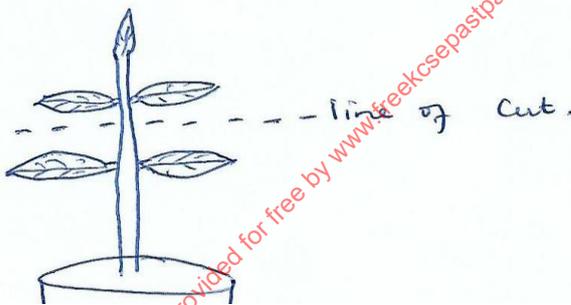


- a. Name the parasite; [1mk]
- b. Name the disease the patient was suffering from; [1mk]
- c. State **three** ways the above disease can be controlled. [3mks]

19. A human egg is described as haploid.
- ii. What is meant by the term haploid. [1mk]
 - iii. What is the importance of eggs being haploid? [1mks]
20. Below is a diagram of a plant cell



- a. What name is used to describe such a cell. [1mk]
 - b. Describe what has happened to the cell [3mks]
21. A. Explain how each of following affect enzyme controlled reaction;
- a. Temperature (2mks)
 - b. pH (1mk)
22. a. Name the cartilage found in between vertebrae of vertebral column [1mk]
- b. State **two** functions of the cartilage named in [a] above [2mks]
23. State **two** differences between smooth muscles and skeletal muscles [2mks]
24. A. Give the difference between pyramid of biomass and pyramid of numbers [2mks]
- b. Why is pyramid of biomass a better method of representing ecological relationships in habitats [1mk]
25. Explain why an athlete pants heavily after sprint race [2mks]
26. In an experiment a shoot tip of a young tomato plant was decapitated as shown below



- a. State the expected results after two weeks [1mk]
 - b. Give a reason for your answer in [a] above [2mks]
27. State the importance of fossils as evidence of organic evolution. [2mks]
28. State the importance of the following features in a respiratory surface. [2mks]
- a. moist
 - b. thin wall
29. When seedlings are grown in the dark, they become tall with long internodes, yellow in Colour and weak.
- a. What name is used to describe the phenomenon. (1mk)
 - b. Explain the observation made above: (2mks)
30. a) What is glycolysis (1 mark)
- b) Where in a cell does glycolysis occur. (1 mark)
 - c) Explain why patients who cannot feed orally are given glucose in a drip. (1 mark)
31. State the function of the following structures in the human ear.
- (a) Semi – circular canals. (1mark)
 - (b) Eustachian tube. (1mark)

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

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

- a) Which one of the regions was likely to be at 4,000M above sea level? Give a reason for your answer. (2 marks)
- b) Why was it necessary to take results after a duration of 2 weeks? (1marks)

GATUNDU SOUTH SUB-COUNTY

231/2

Biology Theory

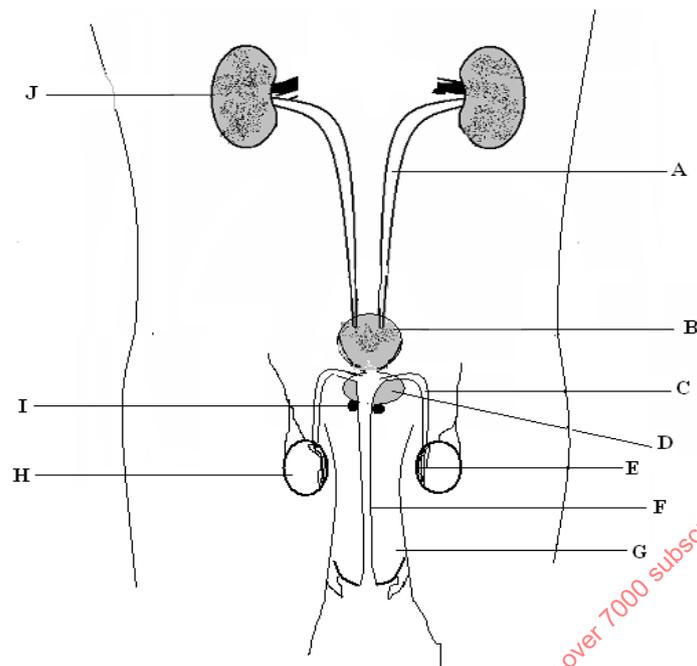
Paper 2

Section A: Answer all questions

1. (a) What is sex linkage in genetics? (1mk)
- (b) Haemophilia is a sex-linked disorder in human. It is caused by a recessive allele [h] present on the X-chromosome. A normal man marries a carrier female.
- i) What are the genotypes of the parents in this marriage? (2mks)
- ii) What would be the genotypes of the offsprings in the marriage above?
Show your working. [4mks]
- iii) From the offsprings obtained in ii) above, give the phenotype of completely normal children to haemophiliac children. [1mk]
2. (a) A Student was studying red blood cells and the effect of different solutions on them. He puts 10ml of solution X, Y and Z in three boiling tubes. The solutions were of different concentration. Into each of the three solutions, he puts three drops of the blood samples. The experiment was left to stand for 30 minutes. He placed one drop of solution X on a glass slide and observed under the microscope. The same procedure was repeated for solution Y and Z. He made the following observations.
- | Solution | Observation |
|----------|--------------------|
| X | normal cells |
| Y | wrinkled cells |
| Z | no cells observed. |
- i) What was the physiological process being investigated? [1mk]
- (b) Explain why red blood cells observed in solution Y were wrinkled [3mk]

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5. The diagram below shows front view of male human urino-genital system. Study it to answer the questions that follow



- a) Name the parts labeled **J**, **A**, **B** and **F**. (4 marks)
 b) State the function of parts labeled **H** and **E**. (2 marks)
 c) Name the secretion produced by structure **D** and **I**. (2 marks)

SECTION B

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

6. Diabetes mellitus is a condition whereby the body is unable to maintain a constant concentration of glucose in blood. It is caused by failure of pancreas to secrete sufficient insulin hormone.

The condition can be controlled by periodic administration of insulin; which can be done through injection into a vein, or breathing in a nasal spray.

The table below shows the concentration of glucose of a person after injecting or inhaling insulin.

Time (hrs)	0	1	2	3	4	5	6	7	8
Glucose concentration in blood (Mg/100 ml) after injection of insulin)	100	68	46	30	22	33	36	38	40
Glucose concentration in Blood (Mg/100ml) after inhaling insulin.	100	42	25	12	16	28	40	52	56

- (a) On the same axis, draw graphs of blood glucose concentration against time. (8 mks)
 (b) (i) After what time is the blood glucose concentration equal? (1 mk)
 (ii) Account for the effect of injecting or inhaling insulin on blood glucose concentration for the first **one** hour. (3 mks)
 (iii) Explain how insulin influences change in blood glucose concentration. (3 mks)
 (c) (i) For a healthy person, in which organ is insulin produced? (1 mk)
 (ii) State two symptoms of a person suffering from *Diabetes mellitus*. (2 mks)
 (d) Suggest one advantage and one disadvantage of inhaling insulin rather than injecting it. (2 mks)
 Advantage:
 Disadvantage...

7. (a) Describe the adaptation of hydrophytes to their photosynthetic function [10mks]
 (b) Explain how mammalian ileum is adapted to perform its function. [10mks]
 8. Explain how seeds and fruits are adapted to the various methods of dispersal. (20 marks)

GATUNDU SOUTH EVALUATION EXAMINATION

231/3

BIOLOGY PAPER 3

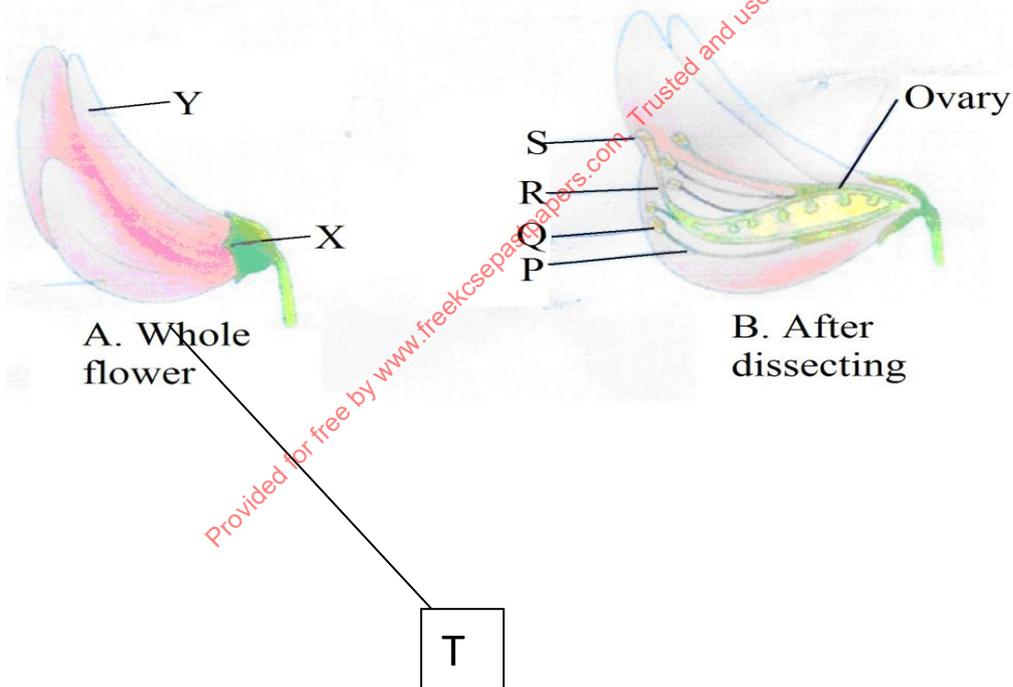
JULY 2019

CONFIDENTIAL.

The information contained here should not be availed to unauthorized persons.

1. Photographs must be coloured
2. Olive oil 2 mls per candidate
3. Iodine solution
4. Pestle and mortar
5. Ethanol labeled L₁ one ml
6. One big irish potato
7. Scapel
8. Ruler

PHOTOGRAPHS FOR QUESTION ONE.



PHOTOGRAPH FOR QUESTION THREE (G)



M

Z

X

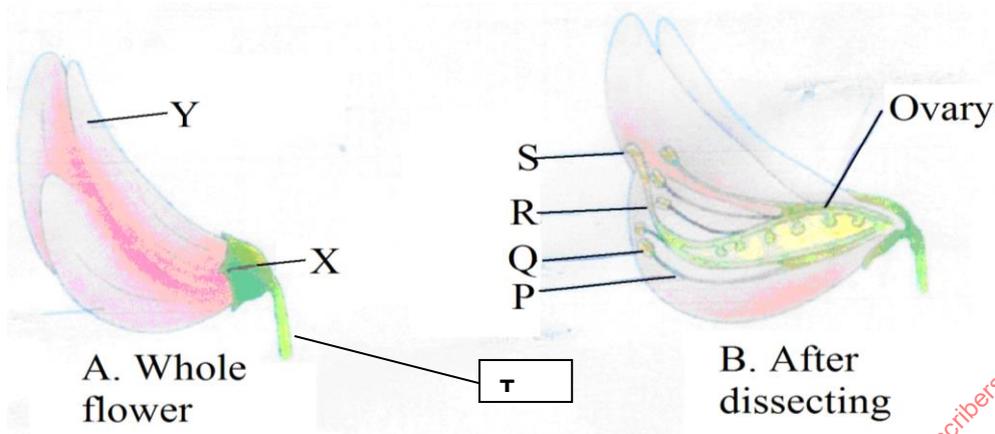
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**GATUNDU SOUTH JOINT EVALUATION TEST.
FORM FOUR END OF TERM TWO EXAM.
BIOLOGY PAPER 231/3**

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

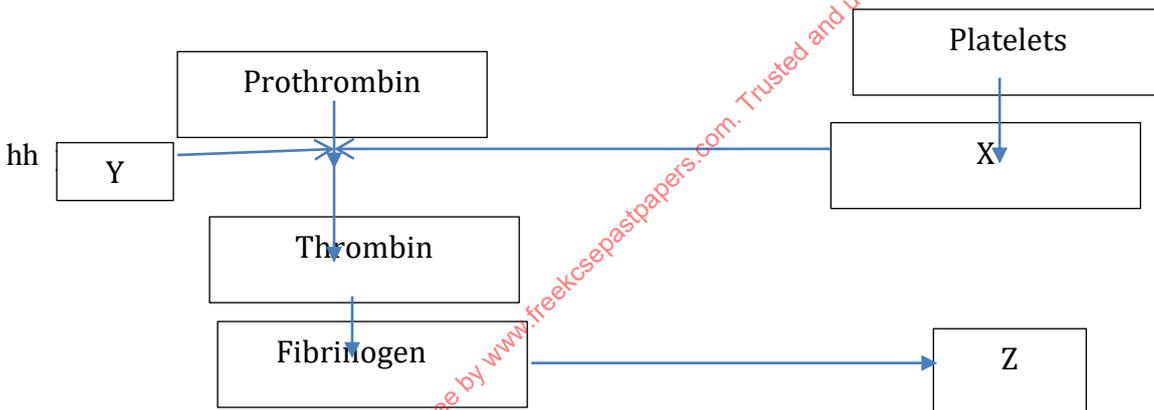


- (a) Name the parts marked Q,R,S and X (4mks)
- (b) State the functions of parts X ,Y and R . (3mks)
- (c) Briefly describe the nature of the corolla of the flower above (2mks)
- (d) Which term best describe the nature of the calyx of the flower above (1mks)
- (e) (i) What type of ovary does the flower have? (1mks)
- (ii) Give a reason to support your answer in f(i) above (1mks)
- (g) Giving reasons state the agent of pollination in this flower
- i. Agent (1mks)
- ii. Reasons (1mks)
2. You are provided with olive oil, liquids labelled L₁ and L₂ and Irish potato. Label two test tubes A and B. Place 2cm³ of water into each test tube. Add 4 drops of olive oil into each test tube. To test tube labelled A, add 4 drops of liquid L₁. Shake both test tubes. Allow to stand for 2 minutes.
- a) i) Record your observations.
- Test tube A (1 mark)
- Test tube B. (1 mark)
- ii) Name the process that has taken place in test tube A. (1 mark)
- iii) State the significance of the process named (a)(ii) above . (2 mark)
- iv) Name the:
- Digestive juice in humans that has the same effect on oil as liquid L₁. (1 mark)
- Region of alimentary canal into which the juice is secreted. (1 mark)
- b) Label two test tubes C and D.
- Place 2cm³ of liquid L₂ into each. Add a drop of iodine into each test tube.
- i) Record your observation. (1 mark)
- ii) Suggest the identity of L₂. (1 mark)
- From the Irish potato provided, cut out a cube whose sides are 1cm. Crush the cube to obtain a paste. Place the paste into a test tube labelled C. Leave the setup for at least 30 minutes.
- iii) Record your observations. (1 mark)
- iv) Account for the results in (b) (iii) above. (3 marks)
3. (a) Name the parts labeled M,N,X and Z on photograph G. (4mrks)
- (b) State the function of the structures labeled M , N and Y (3 mrks)
- (c) State three functions of the organ labeled Z. (3 mrks)
- (d) (I) Name the class to which the dissected animal in photograph G belongs to. (1mrk)
- (ii) Give a reason for your answer in c (I) above (1 mrk)

KAPSABET BOYS
231/1 BIOLOGY
PAPER ONE

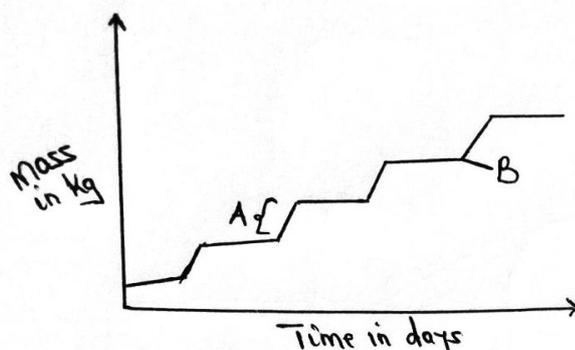
SECTION A

1. A young scientist observed a bird laying her eggs in a nest and later the eggs hatched into chicks. Name three characteristics shown by the chicks that show a chick is a living thing but an egg is not (3mks)
2. Which organelles should be abundant in;
 - i) Skeletal muscle (1mk)
 - ii) Palisade tissue (1mk)
3. A form 1 student was preparing temporary slides in the laboratory, in the course of preparation he carried out the following processes;
 - i) Sectioning
 - ii) Fixation
 - iii) Staining
 State the importance of the above processes (3mks)
4. Why are lysosomes many in phagocytic cells (2mks)
5. Differentiate between guttation and transpiration (2mks)
6. a) Give a reason why xylem vessel should be dead (1mk)
 b) What is the role of lignin in the wall of the xylem vessel (1mk)
7. Name the disease of the blood characterized by,
 - a) Abnormally large number of white blood cells (1mk)
 - b) Crescent-shaped haemoglobin (1mk)
8. The chart below is a summary of blood clotting mechanism in a man.

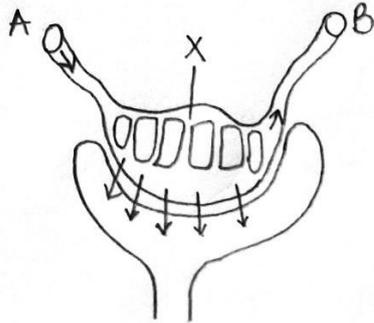


Name;

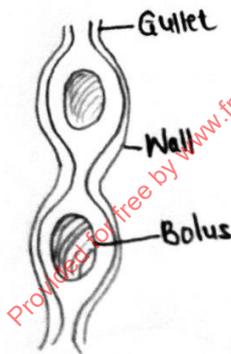
- i) The metal ion represented by Y (1mk)
 - ii) The end product of the mechanism represented by Z (1mk)
9. The graph below represents the growth of animals in a certain phylum. Study it and answer the questions that follow.



- a) Name the type of growth pattern shown on the graph (1mk)
 b) Identify the process represented by letter B (1mk)
 c) Name the hormone responsible for the process in (b) above (1mk)
10. Explain why a mule is infertile (1mk)
11. Phylum Arthropoda is the most successful of invertebrates. Explain two characteristics that make them most successful (2mks)
12. Name phylum whose members possess a notochord (1mk)
13. a) Define evolution and homologous structures (2mks)
 b) State three limitations of using fossil records as an evidence that supports organic evolution (3mks)
14. The following is part of a kidney nephron

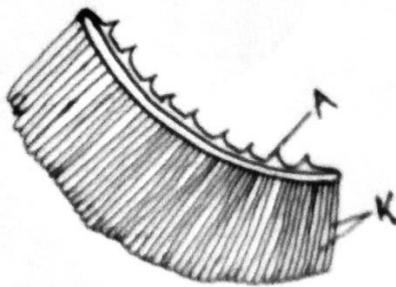


- a) i) Name the process represented by the arrows (1mk)
 ii) Name the conditions necessary for the process named in (a) (i) above to take place (1mk)
- b) Identify with a reason vessel A (1mk)
 c) Name any two blood components that are present in vessel (A) but are absent in vessel B (2mks)
15. The diagrammatic representation below illustrates one of the processes that occurs in mammals during feeding. Carefully study it and answer the following questions



- i) Identify the process (1mk)
 ii) State two structural adaptations of gullet to its functions (2mks)
 iii) Name one enzyme already present in the food bolus within the gullet in man (1mk)
- b) State two functions of mucus secreted by the intestines (2mks)
16. Explain each of the following;
 a) Variegated plants accumulates less food than non-variegated plants under similar conditions.
 b) Most leaves are thin with broad leaf surface (2mks)
17. State the economic importance of the following plant excretory products (3mks)
 a) Papain
 b) Caffein
 c) Colchicine

18. a) State two processes which occurs during anaphase of mitosis (2mks)
 b) What is the significance of first meiotic division (1mk)
 c) State two ways in which HIV/AIDS is transmitted from mother to child (2mks)
19. State the function of the following during pregnancy (3mks)
 a) Amnion
 b) Amniotic fluid
 c) Umbilical cord
20. Name the process by which;
 i) Producers convert sunlight energy into chemical energy (1mk)
 ii) Chemical energy is converted into heat energy by consumers (1mk)
21. Students from Mpesa foundation academy wanted to investigate the population of crabs in their school pond. They caught 50 crabs, marked them with white paint on the cephalothorax and then released them back into the pond. After three days, they came back and caught 50 crabs of which 3 had the white mark.
 a) Using the data above, calculate the population of crabs in the pond (2mks)
 b) Suggest three assumptions the students made during this study (3mks)
22. State any two methods that can be used at home to properly manage domestic effluent (2mks)
23. a) Explain how the following factors increase the rate of diffusion (3mks)
 i) Temperature
 ii) Diffusion gradient
 iii) Size of diffusing particles
 b) Diffusion is a passive process while active transport is an active process. Explain (2mks)
24. a) Waterlogging in terrestrial plants inhibit uptake of certain mineral ions from the soil by the plants. Explain (3mks)
 b) State two illustrations of Osmosis in plants (2mks)
25. The diagram below represents a gill of a fish



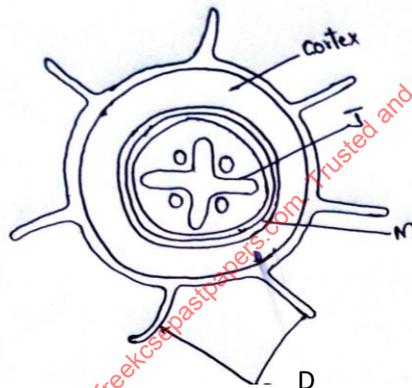
- i) State two ways in which a large surface area is created in structures labelled K (2mks)
 ii) Name the type of flow system that occurs between water and blood in the capillaries present on structures K (1mk)
 iii) Name an organ in human beings that also display the flow system named in (ii) above (1mk)
26. Identical twins were separated after birth and were then raised in different environments. One in Kenya and the other in U.S.A. They rejoined after 18 years and they looked slightly different.
 i) Name the type of variation the twins exhibited (1mk)
 ii) Give two observable differences likely to be noted between the twins (2mks)

**KAPSABET BOYS
FORM FOUR TRIAL 2, 2019
231/2 BIOLOGY
PAPER TWO**

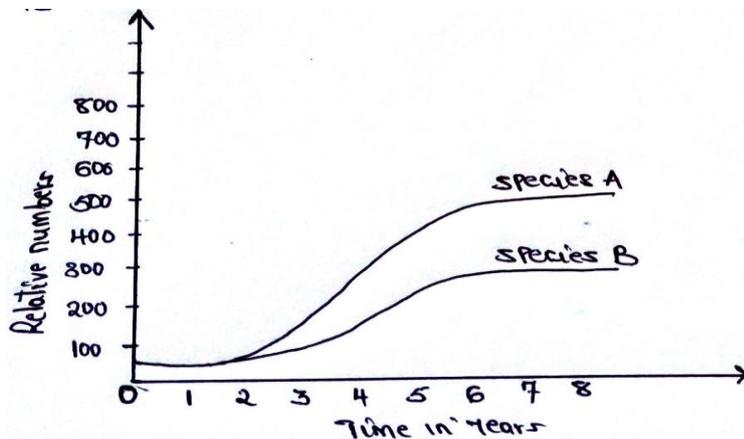
SECTION A (40MKS)

Answer all the questions in this section

1. Haemophilia is a sex linked characteristic caused by a recessive gene located on one of the sex chromosomes.
 - a) Name the chromosome onto which the gene for haemophilia is linked to (1mk)
 - b) A normal man for the condition marries a normal woman for the condition but sadly one of their sons develops this condition from birth.
 - i) What are the likely genotypes of this couple? (2mks)
Man
Woman
 - ii) Using a punnet square, carry out a cross to show why the couple gave birth to haemophiliac son (4mks)
Use (H),to represent the gene for normal condition and (h) to represent the gene for haemophilia
 - iii) Why is this haemophiliac condition very common in males than in female (1mk)
2. The figure below represents an organ obtained from a section of a plant. Use it to answer questions that follow.

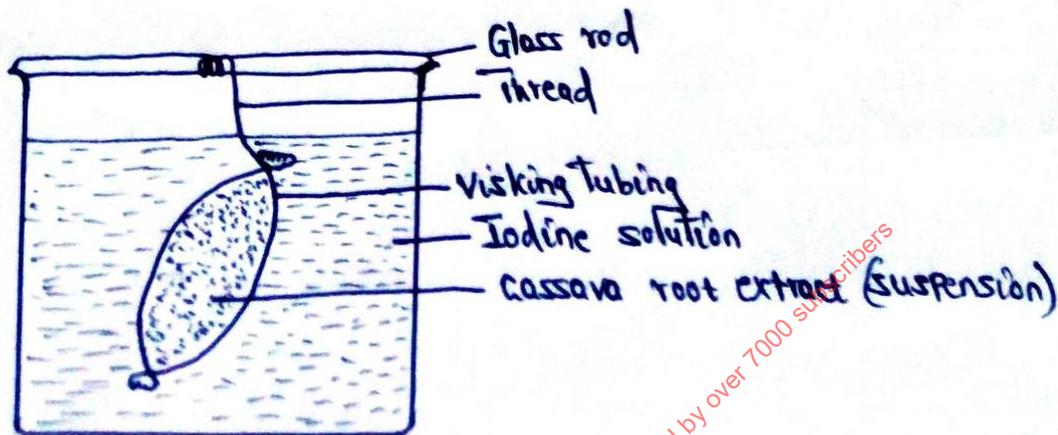


- a)
 - i) Name the organ from which the above section was obtained. Give a reason for your answer (2mks)
 - ii) Structure labelled J is described as a mechanical tissue. Explain (1mk)
 - b)
 - i) Name the process by which water passes across structure M (1mk)
 - ii) Explain two ways by which cells with structures Dare adapted to their functions (2mks)
 - c) Name two strengthening materials that strengthen the collenchyma tissue (2mks)
3. The herbivorous mammalian species were introduced into an ecosystem at the same time and in equal numbers. The graph below represents their populations during the first seven years. Study the graph and answer the questions that follow.



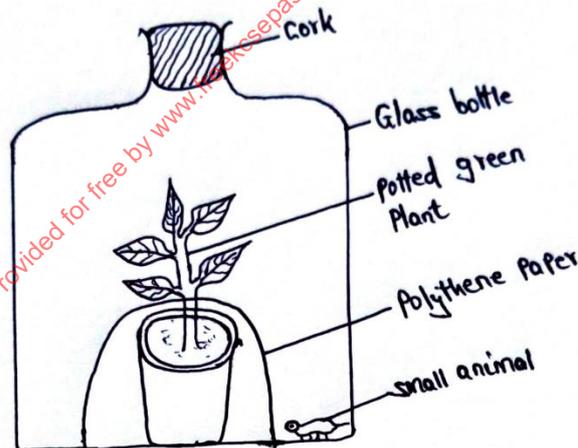
- a) i) Which species has a better competitive ability (1mk)
 ii) Give reason for your answer (1mk)
- b) Account for the shape of the curve of species A between
 i) One year and three years (2mks)
 ii) Three years and seven years (2mks)
- c) A natural predator for species A was introduced into the ecosystem. With a reason state how the population of each species would be affected (2mks)

4. A student from Abogeta secondary set up an experiment as illustrated below.



The visking tubing was left in iodine solution for 4 hours.

- a) State the physiological process being investigated (1mk)
 - b) i) What were the expected results in the visking tubing and in the beaker (2mks)
 ii) Account for your expected result in visking tubing (2mks)
 - c) Mention three factors that influences the rate of active transport (3mks)
5. An experiment was set up to investigate a factor in autotrophism in green plants.



Vaseline was applied at joint between the cork and the mouth of glass bottle and set up was left under sunlight for 6 hours.

- a) Why was it necessary;
 i) To apply Vaseline (1mk)
 ii) To cover the pot with polythene paper (1mk)
 iii) What was the purpose of including the small animals? Give two reasons. (2mks)
- b) i) What would happen to the small animal if the set up was left over night in darkness (1mk)
 ii) Account for the answer in b (i) above (1mk)
- c) State the respiratory surface of the following organism (2mks)
 i) Amoeba
 ii) Fish

SECTION B (40MKS)*Answer question 6 (Compulsory) and choose either question 7 or 8*

6. A hungry person had a meal, after which the concentration of glucose and amino acids in the blood were determined. This was measured hourly as the blood passed through the hepatic portal vein and the iliac vein in the leg. The results were as shown in the table below.

Time (Hrs)	Concentration of contents in Hepatic portal vein (Mg/100ml)		Concentration of contents in the iliac vein of the leg (Mg/100ml)	
	Glucose	Amino acids	Glucose	Amino acids
0	85	1.0	85	1.0
1	85	1.0	85	1.0
2	140	1.0	125	1.0
3	130	1.5	110	1.5
4	110	1.5	90	3.0
5	90	3.0	90	2.0
6	90	2.0	90	1.0
7	90	1.0	90	1.0

- a) Using the same axes draw graphs of concentration of glucose in the hepatic portal vein and the iliac vein in the leg against time (7mks)
- b) Account for the concentration of glucose in the hepatic portal vein from;
- 0-1 hour (2mks)
 - 1-2 hours (3mks)
 - 2-4 hours (3mks)
 - 5-7 hours (2mks)
- c) Account for the difference in the concentration of glucose in hepatic portal vein and the iliac vein between 2 and 4 hours (2mks)
- d) Using the data provided in the table explain why the concentration of amino acids in the hepatic portal vein took longer to increase (1mk)

Essays

7. a) Describe the opening and closing of the stomata using the photosynthetic theory (10mks)
- b) Describe blood sugar regulations in mammals (10mks)
8. a) Describe the adaptation of the following plants to their habitat;
- Xerophytes (15mks)
 - Hydrophytes (5mks)

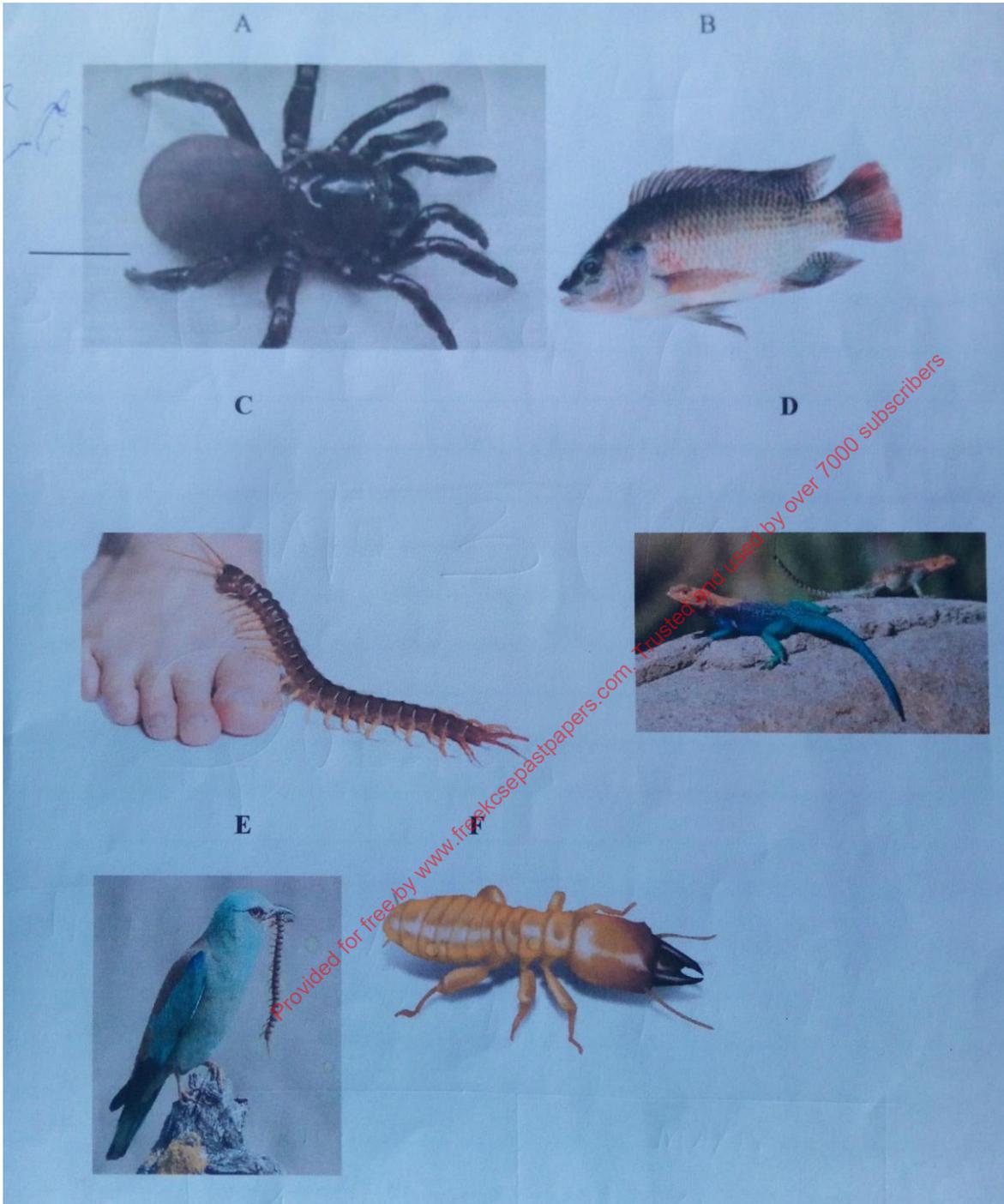
KAPSABET BOYS
FORM 4
BIOLOGY PRACTICAL
CONFIDENTIAL

Each candidate shall require the following

- 10ml hydrogen peroxide solution
- Specimen K (Irish potato)
- Mortar and a pestle
- Four test tubes
- Distilled water in a wash bottle
- A scalpel
- Means of heating (source of heat)
- Test tube holder

**KAPSABET BOYS
231/3 BIOLOGY
PAPER THREE**

INSTRUCTIONS



- 1.a) Organism with endoskeleton go to 2
 1.b) _____ go to 4
 2. a) Has scales on the body go to 4
 2 b) Has no scales on the body mammalian
 3a) Has cephalothorax Arachnida
 3b) Has no cephalothorax go to 5

- 4a) _____ Pisces
- 4b) Has no finsgo to 7
- 5a) Has three pairs of legs Insect
- 5b) Has more than three pairs of legs go to 6
- 6a) Two pairs of legs per segment Diplopoda
- 6b) One pair of legs per segment Chilopoda
- 7a) Has feathersAves
- 7b) Has no feathersgo to 8
- 8a) Has a tailReptilia
- 8b) Has no tailAmphibia

b) Identify the organisms above using the completed key above (6mks)

Specimen	Steps followed	Identity
A		
B		
C		
D		
E		
F		

- c) Name the phylum in which specimens C, E and F belong to. (1mk)
- d) Give three reasons for your answer in (c) above (3mks)
- e) Name one feature that is common in organisms B, E and D (1mk)

2. You are provided with the following;

- i) Hydrogen peroxide
- ii) Specimen K
- iii) Pestle and mortar
- iv) 4 test tubes
- v) A scalpel
- vi) Source of heat
- vii) Test tube holder

Using a scalpel, obtain three peeled cubed from specimen K measuring about 1cm x 1cm x 1cm. For the first cube, you are required to boil it in water for five minutes. For the second cube, you are required to crush it into a paste. For the last cube, you are required to use it as it is.

Label three test tubes A, B and C and put 2ml of hydrogen peroxide in each test tube. To test tube A, add the boiled cube and record your observation.

To test tube B, add the crushed paste and record your observation.

To test tube C, add the unboiled cube remaining and record your observation.

a) Complete the table below (3mks)

Test tube	Observation
A	
B	
C	

- b) Explain your observation in test tube A (1mk)
- c) Between test tubes B and C, in which test tube was the volume of foam produced the highest? Explain (3mks)
- d) Apart from temperature, state two other factors that affect the rate of enzyme controlled reactions (2mks)

3. The photographs below shows specimen of different types of fruits. Examine them and answer the questions that follow.



- a) State four differences between specimen P and R (4mks)
- b) State the types of gynoecium and placentation of specimen P, S and V (4mks)
- i) Specimen P Gynoecium
Placentation
- ii) Specimen S Gynoecium
Placentation.....
- iii) Specimen V Gynoecium
Placentation
- c) In the table below name the mode of dispersal for each specimen and the features that adapt the specimen to its mode of dispersal. (6mks)

Specimen	Mode of dispersal	Adaptive features
P		
Q		
R		
S		
T		
v		

- d) Draw and label a plan diagram of specimen V (4mks)

MATUNGU ACK SECONDARY SCHOOL

231/1

BIOLOGY

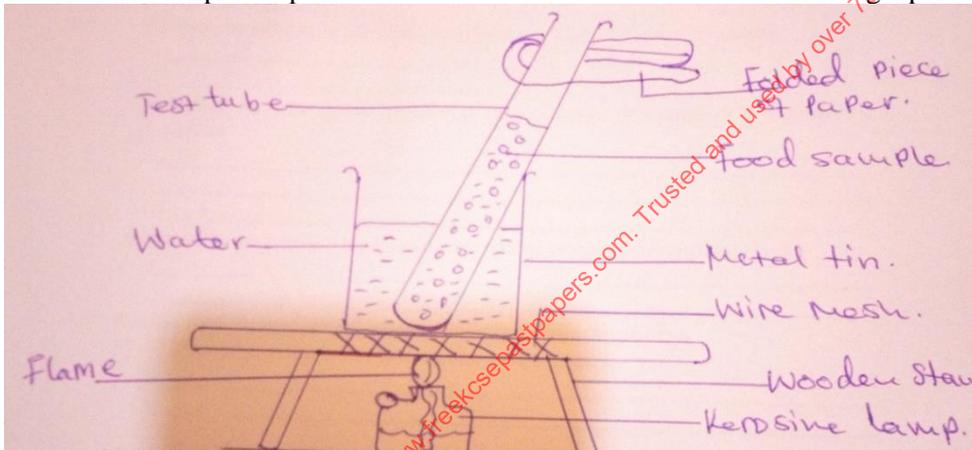
PAPER 1 (THEORY)

Answer ALL questions in this paper

1. Name the organism that causes the following diseases
 - (a) Typhoid fever (1mk)
 - (b) Malaria fever (1mk)
2. State any **three** methods used to prevent the spread of Cholera (3mks)
3. Give the **differences** between the following structures in wind and insect pollinated flowers (3mks)

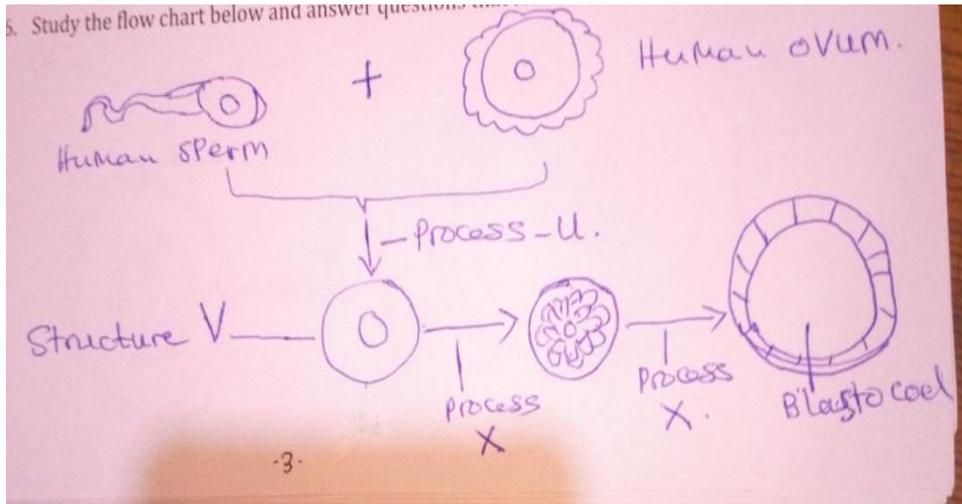
	Wind pollinated	Insect pollinated
Anther		
Pollen grains		
Stigma		

- (b) What is the importance of **cross pollination**? (1mk)
4. (a) Other than **Carbon (IV) oxide**, name the other products of anaerobic respiration in plants (2mks)
- (b) State any **two economic** importance of anaerobic respiration (2mks)
5. Form 4 students set up an experiment to test for certain food substances during a practical lesson.

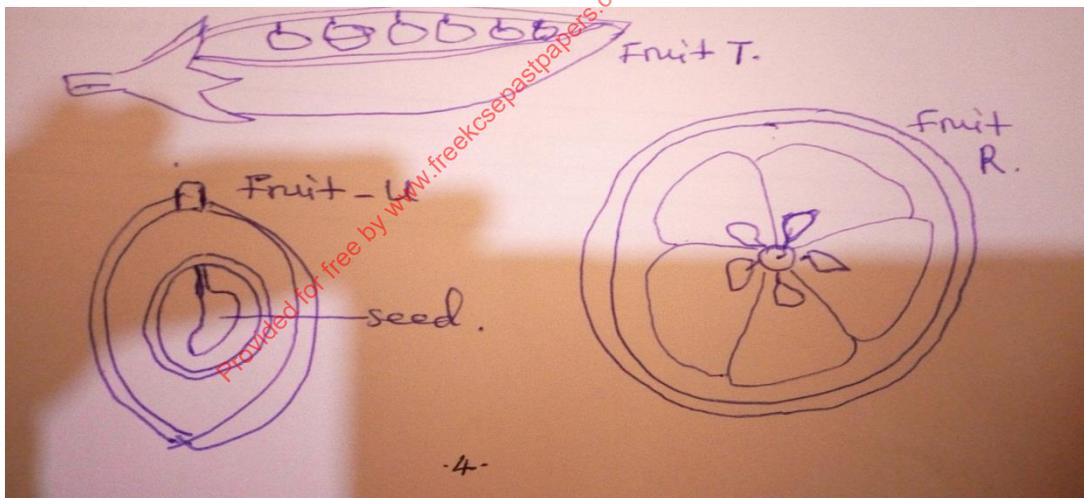


- (a) What does the following apparatus represent in a normal school laboratory? (4mks)
 - (i) Wooden stand. _____
 - (ii) Kerosene lamp. _____
 - (iii) Folded piece of paper. _____
 - (iv) Metal tin. _____
- (b) State **two** types of foods being tested by the above apparatus (2mks)

6. Study the flow chart below and answer questions that follow

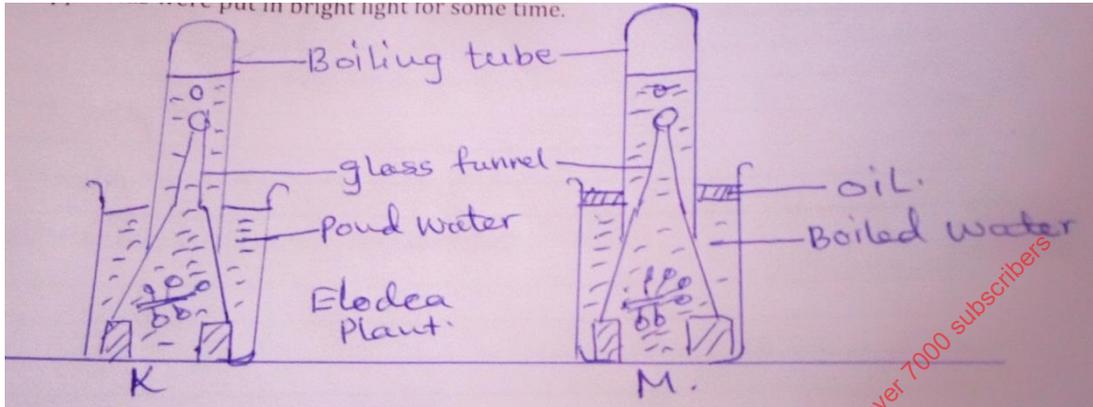


- (a) Name the processes labeled as **U** and **X** (2mks)
U
X
- (b) State the number of chromosomes found in structure labeled **V** (1mk)
- (c) Explain how the diploid number of chromosomes in **structure V** is achieved (2mks)
- (d) State the structure in the human body where process **U** takes place (1mk)
7. Explain the effects of the following pollutants to living organisms. (1mk)
 (i) Discharge of hot water to the water bodies (1mk)
 (ii) Discharge of raw sewage to the rivers (2mks)
 (iii) Discharge of chemical effluents to water bodies (2mks)
8. The diagrams below show the section of various fruits. (1mk)



- (a) Identify the types of fruits labeled as **T**, **U** and **R** above (3mks)
- (b) Name the type of placentation represented by the diagram of fruit **R** (1mk)
- (c) State the functions of the main food substances stored in fruit **T** and **U**. (2mks)
9. Differentiate between homodont and heterodont dentition. (2mks)
10. Explain how age and sex determine energy requirement in humans. (4mks)
11. (a) Define the term osmosis (1mk)
 (b) State any three roles of osmosis in plants (3mks)
12. Explain why it is dangerous to sleep in a poorly ventilated room while using a charcoal stove to cook food. (3mks)
13. What is meant by the following terms (1mk)
 (i) Vestigial structures. (1mk)

- (ii) Homologous structures. (1mk)
- (iii) State an example of vestigial structure in humans. (1mk)
14. A cross between a red flowered plant and a white flowered plant produced plants with pink flowers. Using letter R to represent the gene for red colour and W for white colour,
- (a) Work out a cross between F1 plants. (4mks)
- (b) Give the phenotypic ratio of F2 plants. (1mk)
15. Paramecia cells unlike the red blood cells do not burst when placed in a hypotonic solution, explain. (2mks)
16. The set up below was used by students to investigate a certain physiological process. The apparatus were put in bright light for some time.



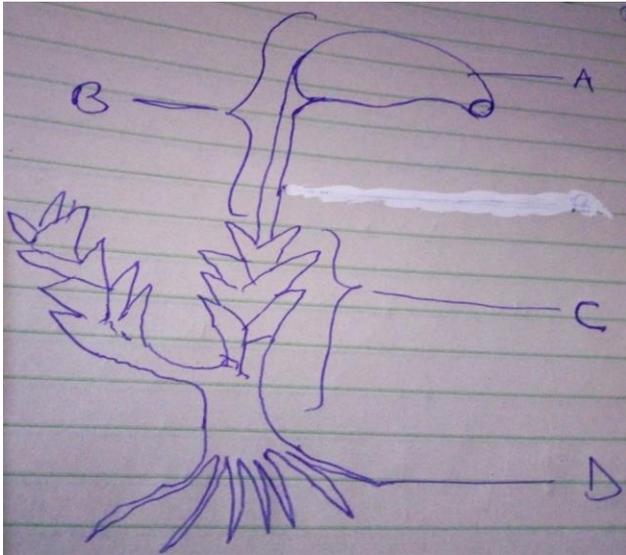
- (a) State the aim of the experiment. (1mk)
- (b) Suggest the expected results in the set up K and M. (2mks)
- K
- M
- (c) Account for the results in (b) above in set up M (2mks)
- Explain why people should avoid eating too much red meat. (2mks)
17. Students wanted to establish the population of fish in a school fish pond. Suggest and describe the most suitable method of population estimation they would have used. (4mks)
18. Explain the characteristics of a respiratory surface. (4mks)
19. Explain why the following procedures are carried out when making sections of plant material for viewing under the light microscope.
- (i) Cutting very thin sections. (1mk)
- (ii) Placing the sections in water. (1mk)
- (iii) Adding the stains on the sections. (1mk)
20. State the roles of the following hormones in homeostasis.
- (i) Insulin hormone (1mk)
- (ii) Antidiuretic hormone (ADH) (1mk)
21. What is the effect of a damaged gall bladder on digestion (1mk)

MATUNGU ACK SECONDARY SCHOOL
231/2
BIOLOGY
PAPER 2 (THEORY)

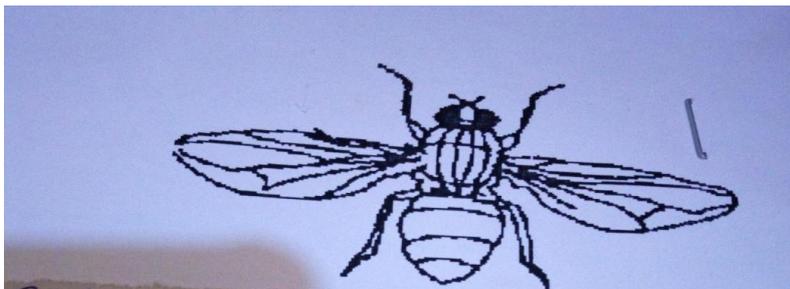
SECTION A – 40MARKS

Answer all questions in this section

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

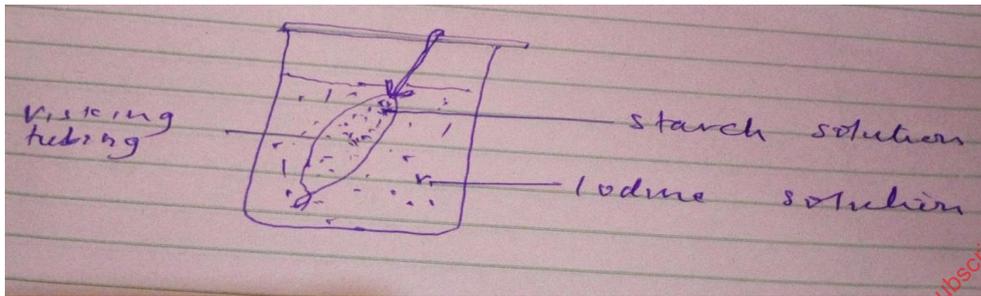


- a) Name the division to which the specimen belongs (1mark)
- b) Name and state the functions of the parts labeled A and D (4marks)
- A- Name.....
- Function.....
- D-Name.....
- Function.....
- c) State the type of generations represented by letters B and C (2marks)
- B.....
- C.....
- d) From the types of generations identified in c(i) above state the dominant generation (1mark)
- 2) In a cattle, the gene for red colour is represented by letter R and that of a white colour as W. A cross between a red bull and a white cow was made and all the off springs of F₁ generation were Roan.
- a) Give a reason for the appearance of a Roan cattle in the F₁ generation (1mark)
- b) Using a punned square work out the F₂ generation of F₁ was selfed (4marks)
- c) State the genotypic and phenotypic ratio of F₂ off spring generation (2marks)
- d) Name the molecule that carries genetic information in eukaryotic cells (1mark)
- 3) Study the diagram of the organism shown below and answer the questions that follow



- a) State the phylum to which the organism belongs (1mark)
- b) With reasons state the class to which the organism belongs

- i) Class (1mark)
- ii) Reasons (2marks)
- c) State two economic importance of the organism (2marks)
- d) What type of metamorphosis does the organism show (1mark)
- 4) State two causes of missing links in tracing the evolutionary history of man (2marks).
- b) How is comparative embryology an evidence of organic evolution (2marks)
- c) i) What is meant by the term adaptive radiation as used in evolution (2marks)
- ii) Give two examples of adaptive radiation in the evolution of animals (2marks)
- 5) An experiment was set up as shown in the diagram below



- a) State the physiological process being investigated in the set up above (1mark)
- b) Explain the expected result after about 30 minutes (3marks)
- c) Explain why plant cells do not burst when immersed in distilled water (2marks)
- d) Distinguish between active transport and diffusion (2marks)

SECTION B – 40 MARKS

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

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

Amount of glucose in mg/100ml of blood																	
Iliac artery	2	2	2	2	2	2	2	2	8	20	24	22	28	24	22	28	20
Hepatic vein	2	22	24	24	24	24	18	12	6	4	2	2	2	2	2	2	2
Time of day	0	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

- a) On the same axis, plot a line graph to show amount of glucose in mg/100ml of the blood against time of the day in a 24hour day up to 4.00pm (10marks)
- b) At what time of the day was the amount of glucose the same in the iliac artery and hepatic vein
- c) Account for the rise in glucose levels in the iliac artery peaks at (2marks)
 - i) 11.00hours
 - ii) 14.00hours
- d) Which organ and hormone is responsible for raising the sugar levels in hepatic vein between 00.00hours and 02.00hours (2marks)
 - Organ
 - Hormone

- e) Name the hormone responsible for the fall of glucose and complex polysaccharide that forms between 14.00hours and 06.00hour (2marks)
Hormone
Complex polysaccharide
- f) Name a disease that would have resulted if the hormone in (e) above failed to be produced (2marks)
- 7) Describe air pollution under the following headings (20marks)
- 8) a) Causes and effects in the environment
b) Control measures
- 9) a) Describe the digestion of lipids in humans (10marks)
b) Describe how the process of the photosynthesis takes place in green plants (10marks)

SHIBALE ACK SECONDARY SCHOOL

231/3

BIOLOGY

PAPER 3

CONFIDENTIAL – BIOLOGY

- Hibiscus flower (labeled P)
- Maize seedling (germinated for 8 – 10days) (labeled Q)
- Benedict's solution
- Two test tubes
- Iodine solution
- Test tube holder
- Labels
- Means of heating
- Scalpels
- Hand lens
- Distilled water
- Mortar and pestle

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MATUNGU ACK SECONDARY SCHOOL
231/3
BIOLOGY
PAPER 3 (PRACTICAL)

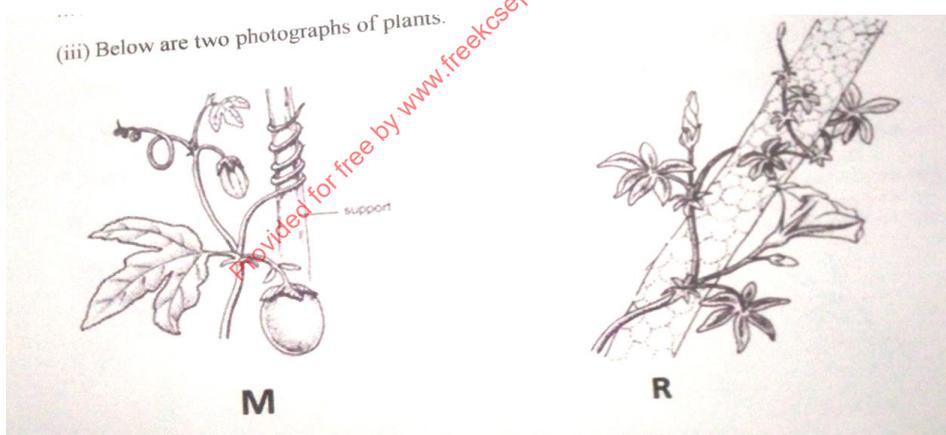
1. You are provided with specimen labeled Q. Remove the endosperm and crush using a mortar and pestle. Add distilled water and obtain a solution. Decant the mixture to obtain solution Q1. Using the reagents provided, test the food present in solution Q1 (8marks)
 - b) Account for your observation in (a) above (3marks)
 - c) Name the type of germination represented in the specimen above (1mark)
2. You are provided with a photograph with part of human skeleton. Use it to answer questions that follow



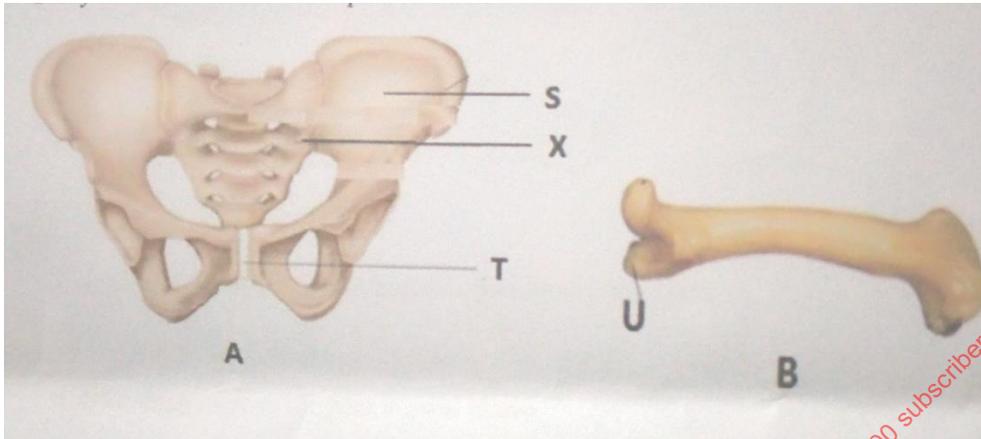
- i) Name the first vertebra labeled E and state how it is adapted to its functions (4marks)

Name

Adaptations
- ii) Name the structure in the skull that articulates with the vertebra E (1mark)
- iii) Below are two photographs of plants



- a) Identify support structures used by the plants in photographs M and R shown above (2marks)
- b) Other than the structures illustrated above, name any one support structure in herbaceous plants (1mark)
- c) The photographs below represent some skeletal materials obtained from a certain mammal. Study them and then answer the questions that follow



- i) Identify fused bone labeled X (1mark)
 - ii) Name parts S and T on photograph A and part U on photograph B (3marks)
 - iii) Name the type of joint formed at the proximal and distal end of bone B (2marks)
 - Proximal end
 - Distal end
 - iv) Name the type of joint found in structure labeled X (1mark)
2. You are provided with specimen labeled P. using a sharp scalpel, cut the specimen longitudinally to obtain two halves. Draw a large well labeled diagram of one of the sections obtained (5marks)
- b) Identify the agent of pollination of the above specimen (1mark)
 - i) Give three reasons for your answer above
 - ii) Describe the floral parts of the specimen P (4marks)

MATUNGU SUB-COUNTY JOINT EVALUATION EXAMINATIONS 2019
MARKING SCHEME
231/3
BIOLOGY

PAPER 3 (PRACTICAL)

1. You are provided with specimen labeled Q. remove the endosperm and crush using a motor and pestle. Add distilled water and obtain a solution. Decant the mixture to obtain solution Q1. Using the reagents provided, test the food present in solution Q1 (8marks)

Food	Procedure	Observations	Conclusion
<i>Starch</i>	<i>Put 2cm³ of test solution in a test tube, add 3 drops of iodine solution</i>	<i>Brown colour of iodine solution persists</i>	<i>Starch absent</i>
<i>Reducing sugar</i>	<i>Put 2cm³ of test solution in a test tube. Add equal amount of Benedict's solution, heat to boil</i>	<i>Orange colour observed</i> <i>Accept green, yellow</i>	<i>Reducing sugar present</i>

- b) Account for your observation in (a) above (3marks)
Starch absent; all starch hydrolysed/broken down by enzyme (diastase; into simple sugars. (Accept converse)

c) Name the type of germination represented in the specimen above (1mark)

Epigeal germination

2. You are provided with a photograph with part of human skeleton. Use it to answer questions that follow



i) Name the first vertebra labeled E and state how it is adapted to its functions (4marks)

Name **atlas**

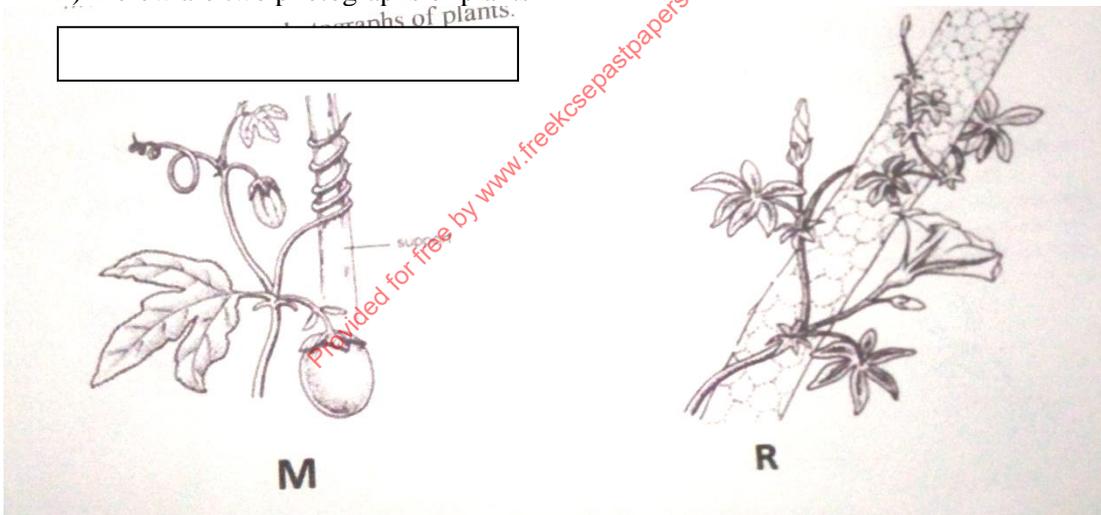
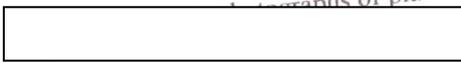
Adaptations

- **Wide neural canal for passage of the large spinal cord in the neck**
- **Broad facets for articulation with the occipital condyles of the skull**
- **Broad and flattened wing-like transverse process to offer a large surface area for attachment of neck muscles**

ii) Name the structure in the skull that articulates with the vertebra E (1mark)

Occipital condyles

iii) Below are two photographs of plants

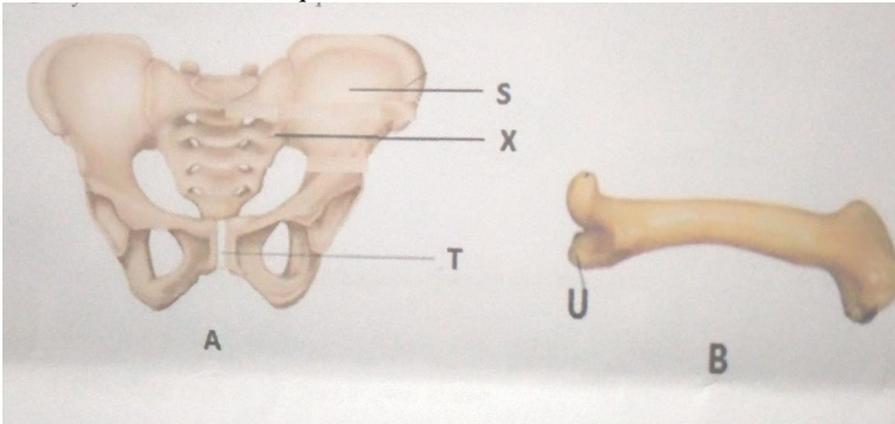


d) Identify support structures used by the plants in photographs M and R shown above (2marks)

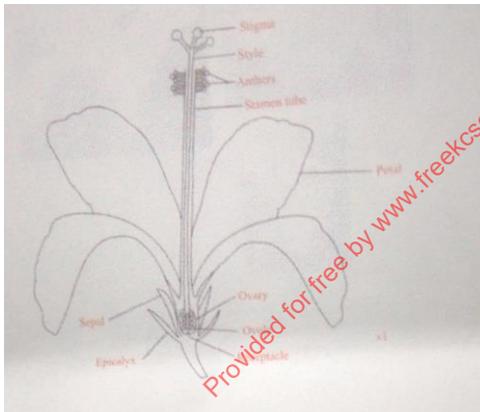
M – tendrils,

R – Twinning stem

e) The photographs below represent some skeletal materials obtained from a certain mammal. Study them and then answer the questions that follow



- a) Identify fused bone labeled X (1mark)
Sacral vertebra rej. Vertabrae
- b) Name parts S and T on photograph A and part U on photograph B (3marks)
S – Ilium
T – Pubis symphysis
M - Greater trochanter
- c) Name the type of joint formed at the proximal and distal end of bone B (2marks)
 Proximal end **Ball and socket joint**
 Distal end **Hinge joint**
- d) Name the type of joint found in structure labeled X (1mark)
immovable/fixed joint
- II) You are provided with specimen labeled P. using a sharp scalpel, cut the specimen longitudinally to obtain two halves. Draw a large well labeled diagram of one of the sections obtained (5 marks)



- b) Identify the agent of pollination of the above specimen (1mark)
Insect pollinated
- ii) Give three reasons for your answer above (3marks)
 – **Brightly coloured**
 – **Large/conspicuous**
 – **Scented**
 – **Tubular/funnel shaped**
- iii) Describe the floral parts of the specimen P (4marks)
Syncarpous
Floral parts in fives
Polysepalous
Hypogynous ovary (superior)/Ovary above other floral parts
Stigma positions higher than parts
Pedicillate flower

KASSU EXAMINATIONS
231/1
BIOLOGY (THEORY)
PAPER 1

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

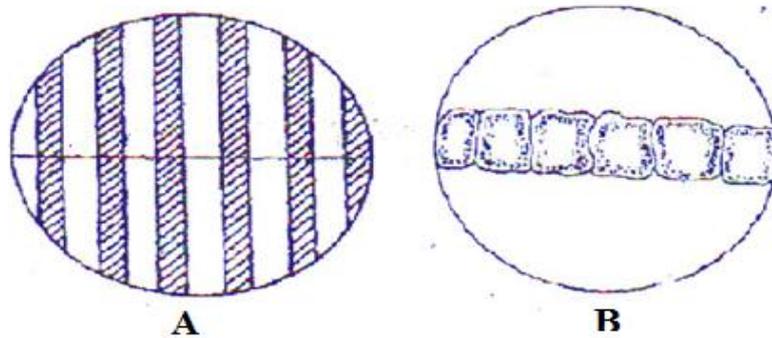


- a) Identify the parasite transmitted into human blood by the organism. (1 mark)
 - b) Name the blood cells that are destroyed by the parasite in (a) above. (1 mark)
 - c) State one biological method used to eradicate the larvae of this organisms. (1 mark)
2. Give the structural adaptations of the following in an insect pollinated plant.
- a. Pollen grain. (1 mark)
 - b. Stigma. (1 mark)
3. State the causative agents of the following diseases
- a) Tuberculosis. (1 mark)
 - b) Syphilis (1 mark)
4. 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)
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.
 10. Why is sexual reproduction advantageous in flowering in plants?
 11. Below is an illustration of an organism captured by students during a practical lesson.

(2 marks)

(2 marks)

(2 marks)



- i. Identify two features that enable the organism to be placed in the phylum Arthropoda.
 ii. Explain why the organism will die when Vaseline is applied on its thorax.
 12. Name two properties of enzyme amylase.
 13. State the significance of natural selection.
 14. Explain why a plant shoot develops lateral branches when its tip is removed.
 15. Why is eating a lot of biscuits harmful to the teeth.
 16. The diagram below shows the structure of a neurone.

(2 marks)

(1 mark)

(2 marks)

(2 marks)

(2 marks)

(2 marks)

(2 marks)



- (a) Identify the neurone and state its function
 (b) Name the part of the brain that is involved in learning and memory.
 17. 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.
 18. Why is it important that the radicle develops first during germination?
 19. a) Explain one event of mitosis that restores the genetic constitution of an organism.
 b) Identify the following types of cell division:
 (i) Division of generative nucleus into male nuclei.
 (ii) Division of cells lining the seminiferous tubules.
 20. State two observable characteristics that show discontinuous variations in *Drosophila melanogaster*
 23. Explain why athletes breathe quickly and deeply after a 100 meters sprint.
 22. a) State two proteins that determine human blood groups.
 b) (i) What is the role of blood capillary?
 (ii) Explain why blood does not clot in undamaged blood vessels.
 23. (a) List one type of chromosomal aberrations.
 (b) State one advantage of polyploidy in modern farming.

(2 marks)

(1 mark)

(3 marks)

(3 marks)

(1 mark)

(1 mark)

(1 mark)

(1 mark)

(1 mark)

(2 marks)

(3 marks)

(1 mark)

(1 mark)

(1 mark)

(1 mark)

(1 mark)

24. Explain:

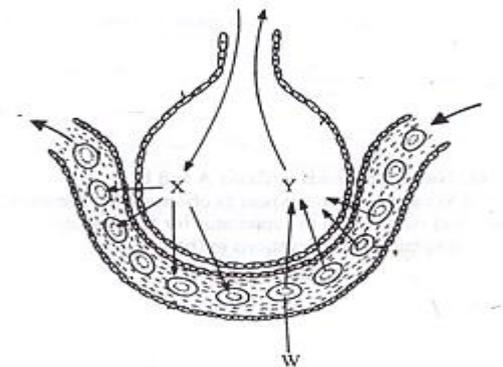
- (a) Why insulin is not administered orally. (1 mark)
- (b) Why stomach wall is lined with mucus (1 mark)

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. The diagram below shows a specimen that was obtained from a tree



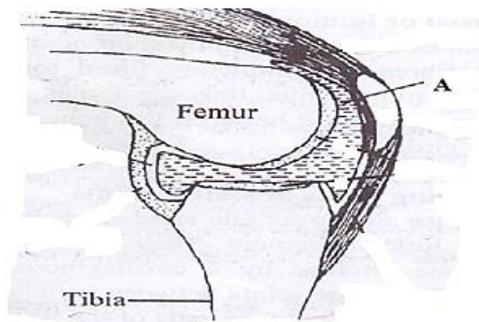
- a. Identify the class the plant from which the specimen was obtained from belongs to. (1 mark)
- b. Identify two observable characteristics that supports your answer in (a) above. (2 marks)

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. Use the illustration below to answer questions that follow



- a) Identify the fluid labeled A and state its function. (2 marks)
 b) Name the type of joint shown above. (1 mark)
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)

KASSU JET EXAMINATION

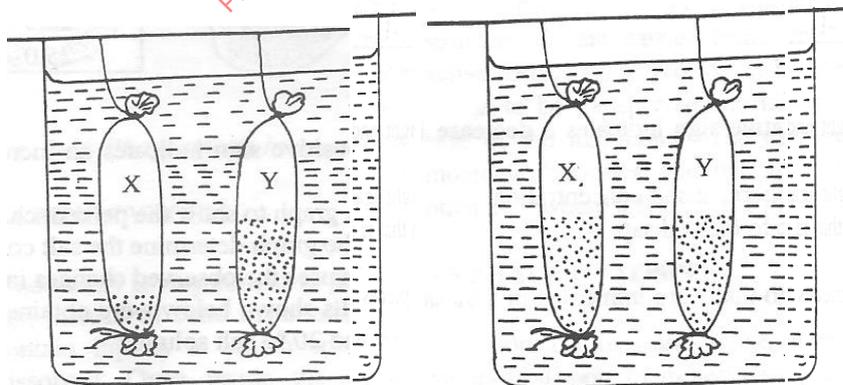
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BIOLOGY

Biology

Paper 2

1. Colour blindness is due to a recessive gene linked to the X chromosome. A man with normal colour vision married a woman with normal colour vision but one of their sons was colour blind.
 a) Using letter N to represent the gene for normal colour vision, work out the genotype of the children. (4mks)
 b) What is the probability of a child born by this couple being a boy and colour blind? (2mks)
 c) Explain why colour blindness is more common in males than females in a population. (2mks)
2. Two visking tubings X and Y were each half filled with 10ml of sugar solutions of different concentrations. The tubings were then immersed in a beaker containing 15% sugar solution and left for four hours. The results were as shown in the diagrams below.



At the end of experiment

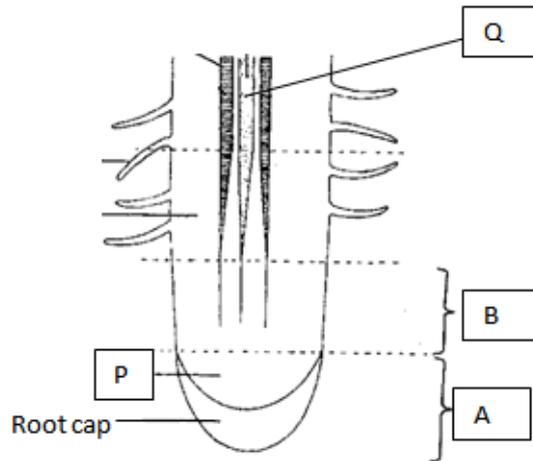
At the beginning of experiment

- a) Name the process being investigated in the experiment. (1mk)
 b) Compare the nature of the solution in to that in the beaker. (1mk)
 c) i) Account for the observation in Y. (2mks)

ii) State and explain the observation that would be made if another visking tubing filled with 30% sugar solution is immersed in the same beaker. (3mks)

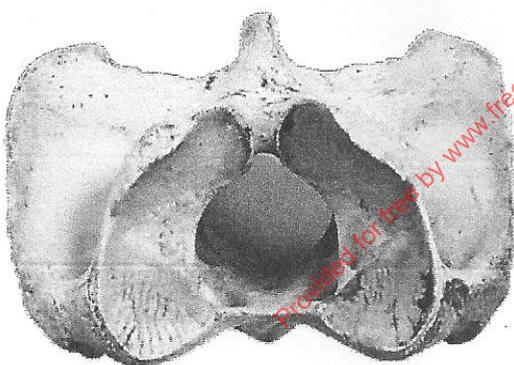
d) Briefly explain the significance of the physiological process named in (a) above in gaseous exchange in plants. (1mk)

3. The diagram below represents a longitudinal section of a root.

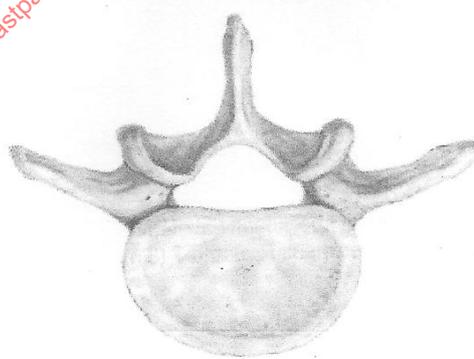


- a) i) Identify zone A (1mk)
- ii) Give two characteristics of cells found in zone A. (2mks)
- b) State two ways in which structure Q is adapted to its functions. (2mks)
- c) Name the hormone produced in high concentrations in the part labelled P. (1mk)
- d) Give two roles of the hormone named in 3 © Above in plants. (2mks)

4. The figures below show two bones that from part of the axial skeleton.



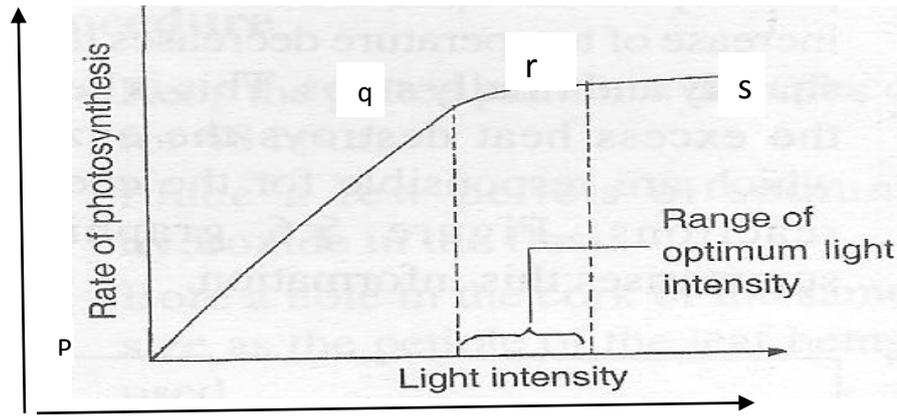
G



H

- a) Identify the bones (2mks)
- b) Give two structural adaptations of bone G (2mks)
- c) State two observable differences between bones G and H (2mks)
- d) Give two functions of intervertebral discs. (2mks)

5. The curve below shows the rate of photosynthesis at different light intensities



- a) With reference to photosynthesis, give the meaning of the phrase limiting factor. (1mk)
- b) Name the limiting factor between the following points (2mks)
 - i) P and Q
 - ii) R and S
- c) Describe what happens during the light stage of photosynthesis. (2mks)
- d) Explain how light affects the rate of photosynthesis. (2mks)
- e) What is compensation point? (1mk)

SECTION B

Answer question 6 and either question 7 or 8

6. Students carried out research on the effect of industrial emissions on the rate of growth of plant shoots and roots. After weeks of observations and analysis, they ended up with results as shown in the table below.

Concentration of Sulphuric acid (mol/dm ³)	Mean root length (mm)	Mean shoot length (mm)
0.0 x 10 ⁻³	55.5	25.2
1.0 x 10 ⁻³	63.4	18.4
3.0 x 10 ⁻³	6.5	9.5
4.0 x 10 ⁻³	2.0	4.6
6.0 x 10 ⁻³	1.8	0.8
7.0 x 10 ⁻³	1.5	0.5
8.0 x 10 ⁻³	1.3	0.3
9.0 x 10 ⁻³	1.3	0.0
10.0 x 10 ⁻³	1.0	0.0

- a) On the same grid, plot a graph of the mean root length and shoot length against the concentration of Sulphuric acid (7mks)
 - a) Describe the relationship between the concentration of Sulphuric acid and the
 - i) Growth of shoots (2mks)
 - ii) Growth of roots (2mks)
 - b) Estimate the mean root and mean shoot length when the concentration of Sulphuric acid is 5.0 (2mks)
 - c) State two other effects of acid rain (2mks)
 - d) State the ways of preventing acid rain (3mks)
 - e) What is eutrophication (2mks)
- 7. Describe the events that take place from the time a pollen grain lands on the stigma until fertilization (14mks)
 - (b) Describe the changes that take place in a flower after fertilization. (6mks)
- 8. a) Discuss the adaptations of the mammalian ear to its functions. (20mks)

KASSU JOINT EXAMINATION**BIOLOGY, 2019****Paper 3****Confidential**

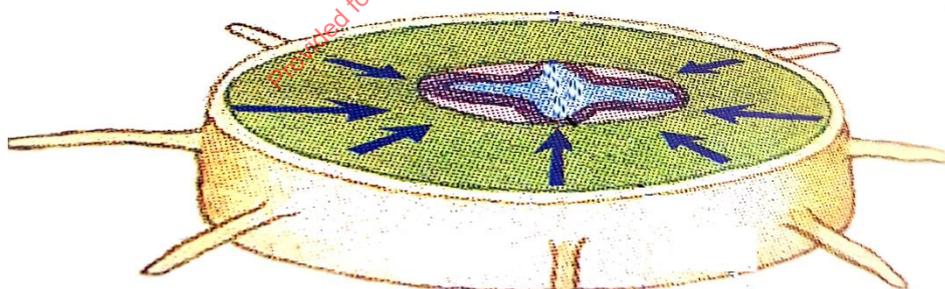
- Ripe orange labelled specimen Q,, 1 per candidate
- A piece of visking tubing (8 cm long), 1 per candidate
- 100ml beaker, 1 per candidate
- Two pieces of thread, 30cm long (2 per candidate)
- Knife/scalpel
- Labels, 3 per candidate
- 0.1% DCPIP
- Benedict's solution
- Sodium Hydroxide
- Copper sulphate
- Distilled water
- Six test tubes on a rack

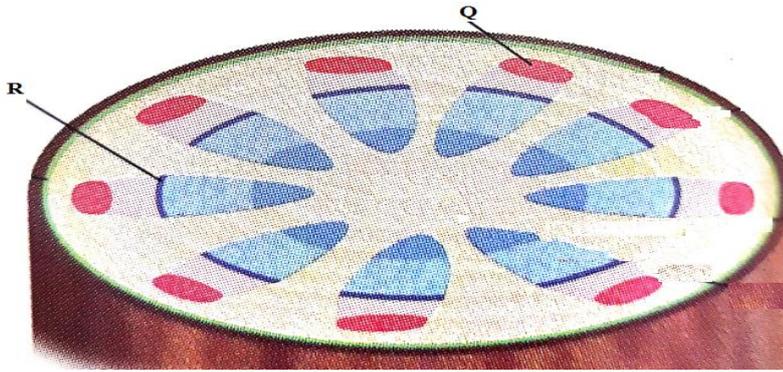
KASSU JOINT EXAMINATION**BIOLOGY****Paper 3****Practical**

1.

- a). You are provided with specimen Q. Cut it into two halves. Squeeze out juice from the two halves into a beaker. Sieve the juice to obtain solution Q1. Divide solution Q1 into two equal amounts. Label them as solution Q2 and Q3. Using the reagents provided, carry out food test on solution Q2. Record your results in the table provided below. (9 marks)
- b) i) You have been provided with a visking tubing. Open it carefully. Tie one end with a piece of thread. Half-fill it with solution Q3. Tie the other end tightly to avoid leakage. Rinse the visking tubing and immerse it in a beaker with distilled water. Leave it to stand for 25 minutes. Using Benedict's solutions only, carry out food test on the contents of the beaker. (2marks)
- ii) Account for your observation in b (i) above. (3 Marks)

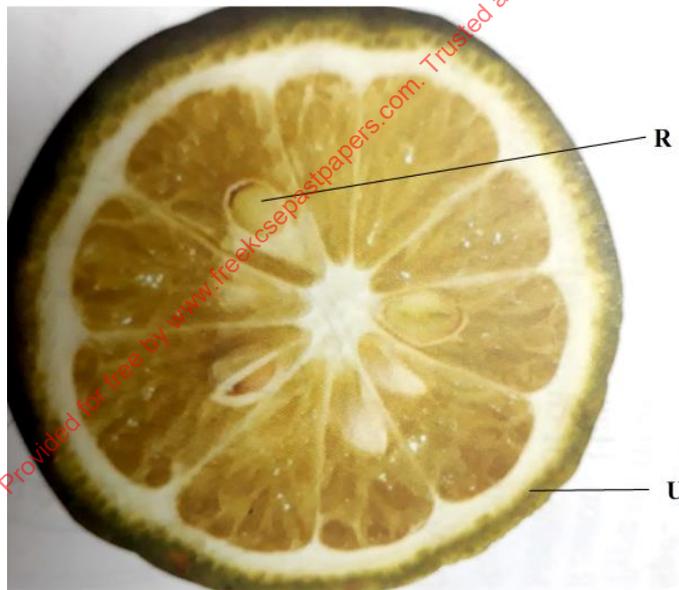
2. Below are sections of dicotyledonous plant organs labelled S and T. Study them carefully and answer the questions that follow.

**T**



S

- a)
- i) Give any three observable differences between the sections (3marks)
 - ii) On the diagram, label any three parts of section T (3marks)
 - iii) State the functions of the parts labelled Q and R on section S. (2marks)
 - iv) How would section S compare with that of a monocotyledonous plant? (3marks)
- b) Below is a section of a plant organ that develops from a flower after fertilization



- i. Name the part of the flower from which the parts labelled R and U develop from. (2marks).
3. a) You are provided with photographs below labelled A, B, C, D, E, F, G and a dichotomous key. Complete the dichotomous key and use to answer the questions that follow. (9 marks).



1. a) Animals with jointed appendages.....go to 3
 b) Animals without jointed appendages.....go to 2
2. a) Animals with slender long body.....Nematoda
 b) Animals with a thick short body.....Mollusca
3. a)go to 5
 b) Animals without wings.....go to 4
4. a) Animals with numerous legs.....Myriapoda
 b)Hymenoptera
5. a) Animals with short antenna.....Diptera
 b) Animals with a pair of long antenna.....go to 6.
6. a) Animals with cuticulized forewings.....Dipteroptera
 b) Animals with a pair of membranous wings.....Hymenoptera

Organism	Steps followed	Identity
A		
B		
C		
D		
E		
F		
G		

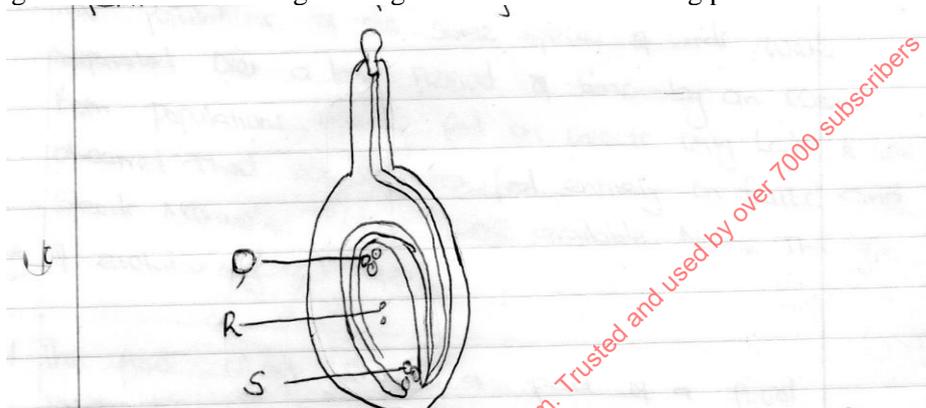
- b) Name the type of metamorphosis in organism B. (1 marks)
 c) Explain how the type of metamorphosis named in (b) above occurs. (3marks)

BUURI EAST STANDARDS

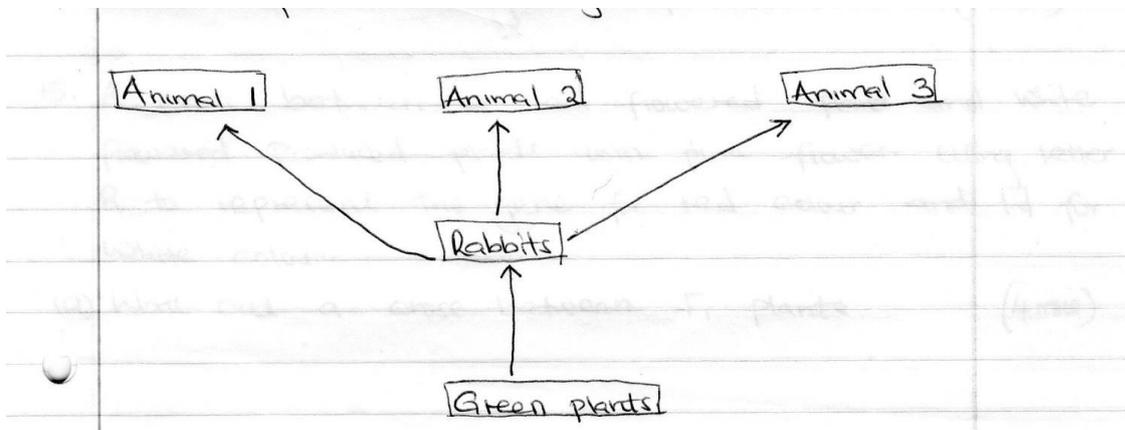
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BIOLOGY (Theory)

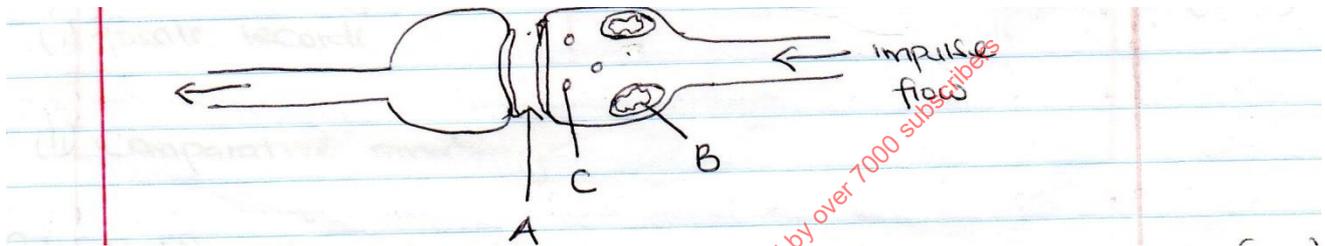
1. Your teacher has allowed you to carry out a study on millipedes in the school compound.
 - a) Name the apparatus you would use to collect the specimens. (1mk)
 - b) What precaution will you observe to maintain ecological balance during your study. (1mk)
2. Give the structure of the cell that performs the following functions.
 - a) Synthesis of ribosomes. (1mk)
 - b) Regulate exchange of substances in and out of the nucleus. (1mk)
3.
 - a) State two characteristics of the kingdom monera that are not found in other kingdom. (2mks)
 - b) Define the term species. (1mk)
4.
 - a) Name two tissues in plants which are thickened with lignin. (2mks)
 - b) How is support attained in herbaceous plants. (1mk)
5.
 - a) State three differences between osmosis and active transport. (3mks)
 - b) What is meant by the term crenation. (1mk)
6. The diagram below shows a stage during fertilization in flowering plants.



- a) Name the parts labelled Q, R, S (3mks)
- b) State the function of the pollen tube. (1mk)
7.
 - a) Distinguish between epigeal and hypogeal germination. (1mk)
 - b) Why is oxygen necessary in the germination of seeds. (2mks)
8. A dog weighing 15.2kg requires 216kJ while a mouse weighing 50g requires 273kJ per day. Explain. (2mks)
9. Account for the loss of dry weight of cotyledons in a germinating bean seeds. (1mk)
10. Two populations of the same species of birds were separated over a long period of time by an ocean. Both populations initially fed on insects only. Later it was observed that one population fed entirely on fruits and seeds. Although insects were available. Name this type of evolutionary change. (1mk)
11. The flow chart shows a part of a food relationship in an ecosystem.



- i) Name the food relationship shown (1mk)
- ii) How many trophic levels are shown in the ecosystem. (1mk)
- iii) What is the main source of energy in the ecosystem. (1mk)
- 12. a) What is the end – product of respiration in animals when there is insufficient oxygen supply? (1mk)
- b) Explain how anaerobic respiration is applied in sewage treatment. (1mk)
- 13. Give reasons for each of the following.
 - a) Constant body temperature is maintained in mammals. (2mks)
 - b) Low blood sugar is harmful to the body. (2mks)
- 14. Name causative agents of cholera. (1 mks)
- 15. A cross between a red flowered plant and white flowered produced plants with pink flowers. Using letter R to represent the gene for red colour and W for white colour.
 - a) Work out a cross between F.1 plants (4mks)
- 16. The following diagram shows parts of a synapse observe and answer the questions that follows.

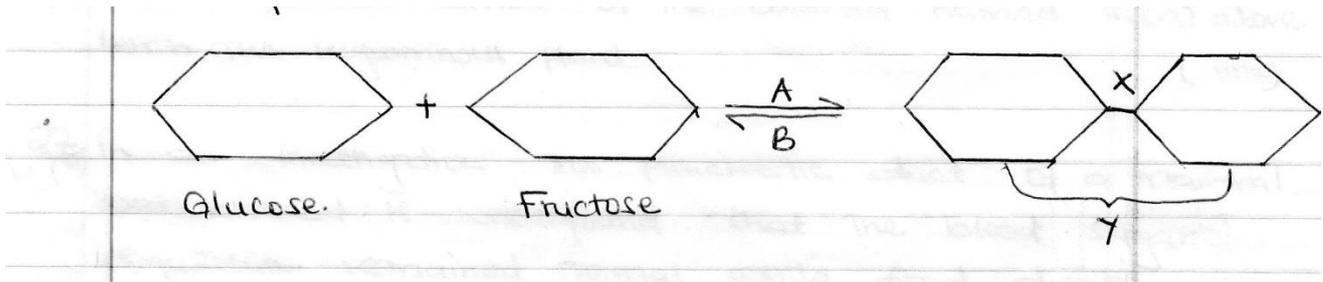


- a) Name the parts labelled A and B (2mks)
- b) What is the role of part labelled C. (1mk)
- 17. What is the importance of sebaceous glands in the human skin. (1mk)
- 18. Give the survival value of the following tropic responses.
 - a) Geotropism (1mk)
 - b) Chemotropism (1mk)
- 19. The diagram below represents a bone obtained from a mammal.

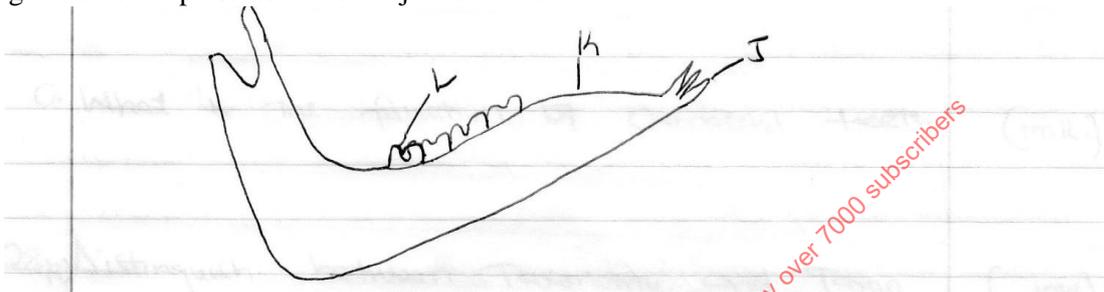


- a) Name the bone (1mk)
- b) Name the bone which articulates with the bone named in (a) above at the cavity labelled K. (1mk)
- 20. Give a reason why each of the following is important in the study of evolution today. (2mk)
 - i) Fossils records
 - ii) Comparative anatomy
- 21. a) Outline two physiological changes that occur in the body to lower the level of carbon (iv) oxide after vigorous physical exercise. (1mk)
- b) Name the site of respiration in a cell. (1mk)
- 22. A farmer walked through his plantation when the plants were flowering. Immediately he developed severe itching and irritation of nasal lining with nasal discharged and sneezing due to pollen inhalation.
 - a) State the name of this body reaction to pollen grains. (1mk)
 - b) Explain how the body reaction occurs. (2mks)
- 23. a) Why is wilting important to plants on a hot sunny afternoon. (1mk)
- b) Uptake of water by plants is not affected by metabolic poisons. Explain (1mk)

24. Study the reaction below and answer the questions that follow.



- a) What biological process are represented by A and B (2mks)
 - b) Identify the product Y (1mk)
 - c) State the bond represented by X (1mk)
25. The diagram below represents the lower jaw of a mammal.



- a) Name the mode of nutrition of the mammal whose jaw is shown. (1mk)
 - b) State one structural and one functional difference between the teeth labelled J and L (2mks)

Structural	
Functional	
26. a) Name the bacterial found in the root nodules of leguminous plant (1mk)
 - b) State the association of the bacteria named in (a) above with the leguminous plant. (1mk)
 27. a) In an investigation, the pancreatic duct of a mammal was blocked. It was found that the blood sugar regulation remained normal while food digestion was impaired. Explain these observations. (2mks)
 - b) A certain animal has no incisors, no canines, 6 premolars and 6 molars in its upper jaw. In the lower jaw there are 6 incisors, 2 canines, 6 premolars and 6 molars. Write its dental formula. (1mk)
 - c) What is the function of carnassials teeth? (1mk)
 28. a) Distinguish between Taxonomy and Taxon. (1mk)
 - b) An organism with an exoskeleton, segmented body, two pairs of legs per segment, a pair of eyes and a pair of short antennae belongs to which class. (1mk)
 - c) Explain how birds of prey are adapted to obtaining their food. (2mks)
 29. a) Pregnancy continues if the ovary of an expectant mother is removed after the 4th Month. Explain (2mks)
 - b) What is the role of the testis in the mammalian reproductive system. (2mks)
 30. a) Name a characteristic of humans, which is controlled by multiple gene (1mk)
 - b) Why is the skin of amphibians like frogs highly folded? (1mk)
 - c) The trachea have a liquid at the endings. State one reason for this (1mk)

BUURI EAST STANDARDS

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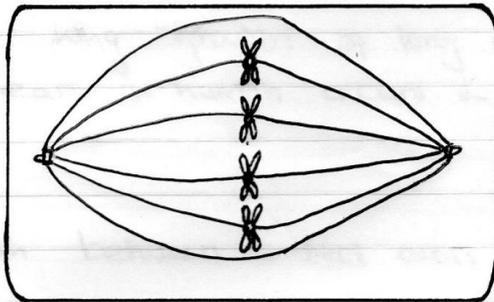
BIOLOGY (Theory)

PAPER 2

SECTION A:

Answer all questions

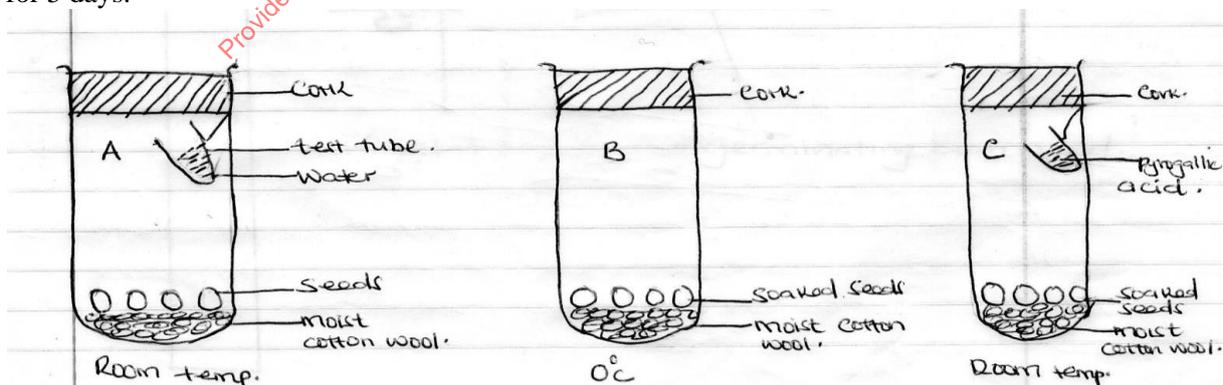
1. a) The diagram below represent a stage in cell division. Study it and answer the questions that follow.



- i) Identify the stage of cell division. (1mk)
- ii) Give a reason for your answer. (1mk)
- b) Give the role of the following parts of the male reproductive system. (2mks)
 - i) Epididymis
 - ii) Prostrate gland
- c) i) Name two mechanisms that prevent self pollination in flowers that have both male and female parts.(2mks)
- ii) State two disadvantages of self pollination. (2mks)
- 2. a) Mwiti and Karimi who are siblings are both normal but their parents have a haemophilic son. Using letter H, give the genotype of their parents. (2mks)
- b) i) What are sex – linked genes. (1mk)
- ii) Explain why growth of long hair on the pinnae of the ears in human occurs in males only. (1mk)
- c) Distinguish between a test cross and a back cross. (1mk)
- d) Part of one strand of a DNA molecule was found to have the following base sequence.

G – T – C – A – G – T

 - i) What is the sequence on m-RNA strand copied from this DNA portion. (1mk)
 - ii) State two role of DNA molecule. (2mks)
- 3. The diagram below represent set up to investigate the conditions necessary for seed germination. The set up was left for 5 days.

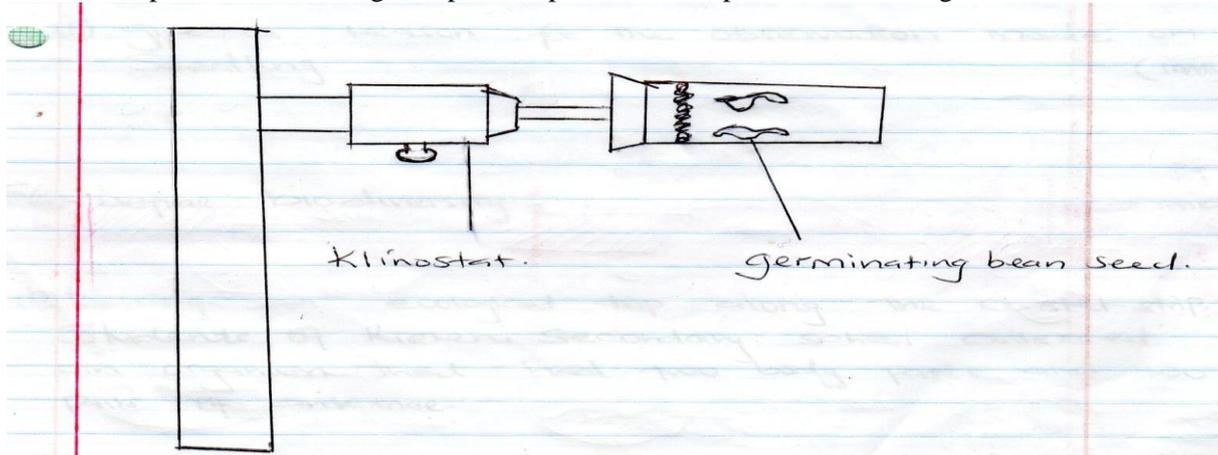


- i) What conditions were being investigated in the experiment. (2mks)
- ii) Explain the role of water during seed germination. (2mks)
- iii) State observation made in jar A and C after five days. (2mks)

iv) Account for the results obtained in set up A and C after five days.

(2mks)

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



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

(1mk)

b) If the klinostat was not rotating

i) State the observation that would be made on seedling after three days.

(2mks)

iii) Explain the observation in (b) (i) above

(3mks)

c) If the experiment was repeated with the Klinostat rotating.

i) State the observation that was made on the seedling after three days.

(1mks)

iii) Give a reason for the observation made on seedling.

(1mk)

5. a) Define bio diversity.

(1mk)

b) During an ecological trip along the coastal strip. Students of Kiereni Secondary school collected an organism that had two body parts and two pairs of antennae.

i) Name the class to which this organism belonged.

(1mk)

ii) Predict the number of legs the organism most likely to have.

(1mk)

iii) All the observed members of these species were found to hide under rocks and leaves. Suggests the benefits that this behavior confers to the organisms.

(2mks)

c) Declining population of insects world wide should be a great concern to the human population. Explain.

(3mks)

SECTION B:

Answer question 6 and either question 7 or 8.

6. Form one students of St Moses carried out an experiment to determine the percentage change in weight of two tender stems of two different plants when placed in two different sucrose solutions of different concentrations.

Sucrose concentration (Mg/ml)	0	5	10	15	20	25	30	35
Percentage change in weight for plant N	7.0	6.6	5.0	3.6	1.6	-0.8	-2.3	-2.8
Percentage change in weight for plant D	3.2	2.2	0.8	-0.6	-1.4	-2.2	-2.8	-3.4

a) On the same axes, in the graph provided below, plot a graph of percentage weight change of the plant stem tissues against sucrose concentration.

(8mks)

b) Account for the results obtained for the plant tissues at 15mg/ml sucrose concentration.

(2mks)

c) From the graph, determine the concentrations of the cells saps of the two plants.

(2mks)

Plant N

Plant D

d) i) Identify the plant that was most likely obtained from a more saline environment?

(1mk)

ii) Explain your answer above.

(1mks)

e) Describe the effect of high osmotic pressure of body fluids on urine formation.

(4mks)

f) Outline two roles of active transport in human body.

(2mks)

7. a) Describe the process of absorption of water from the soil to the leaves. (10mks)
 b) How is mammalian heart adapted to its function? (10mks)
8. a) Define
 i) chemical evolution (2mks)
 ii) organic evolution (2mks)
 b) i) What are vestigial organs? (1mk)
 ii) Give an example of vestigial organs in human beings. (1mk)
 c) Giving example give and account for any five pieces of evidence for organic evolution. (14mks)

BUURI EAST STANDARDS

BIOLOGY 231/3

CONFIDENTIAL INSTRUCTIONS TO SCHOOLS

Each Candidate will require the following.

1. 12ml of starch solution labelled liquid L1.
2. 12ml of glucose solution labelled liquid L2.
3. 8cm of visking tubing.
4. 15cm of a thread.
5. Iodine solution supplied with a dropper.
6. Benedicts solution supplied with a dropper.
7. 4 test tubes on a test tube rack.
8. Test tube holder.
9. Means of timing.
10. Water in a wash bottle.
11. Means of heating .
12. 50ml beaker.

BUURI EAST STANDARDS

231/3

BIOLOGY

(Practical)

PAPER 3

1. You are provided with liquid L1 and L2 and pieces of visking (dialysis) tubing. Spare about 1ml of each of the liquids for part (a) of this question. Using a piece of thread, tightly tie one end of the visking tubing. Open the other end of the visking tubing and half fill it with liquid L1. Tightly tie this end. Ensure there is no leakage at both ends. Immerse the tubing in a beaker containing liquid L2. Leave the set up for at least 30 minutes.

- a) Using iodine and Benedict’s solution provided test for the food substances in liquid L1 and L2. Record your observation in the table below. (4mks)

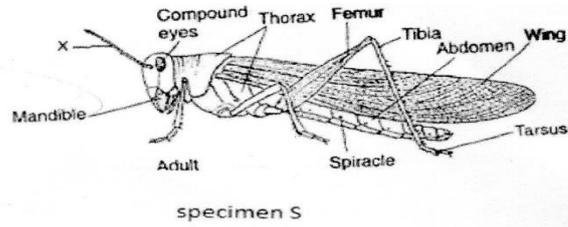
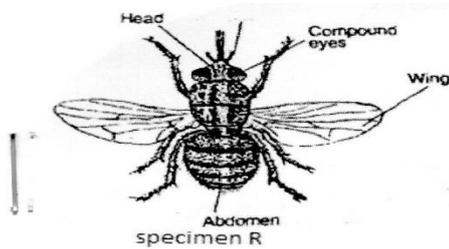
Liquid	Food substance	Procedure	Observation	Conclusion
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After 30 minutes, remove the visking tubing from the beaker and wash the outside of the tubing thoroughly to remove traces of liquid L2.

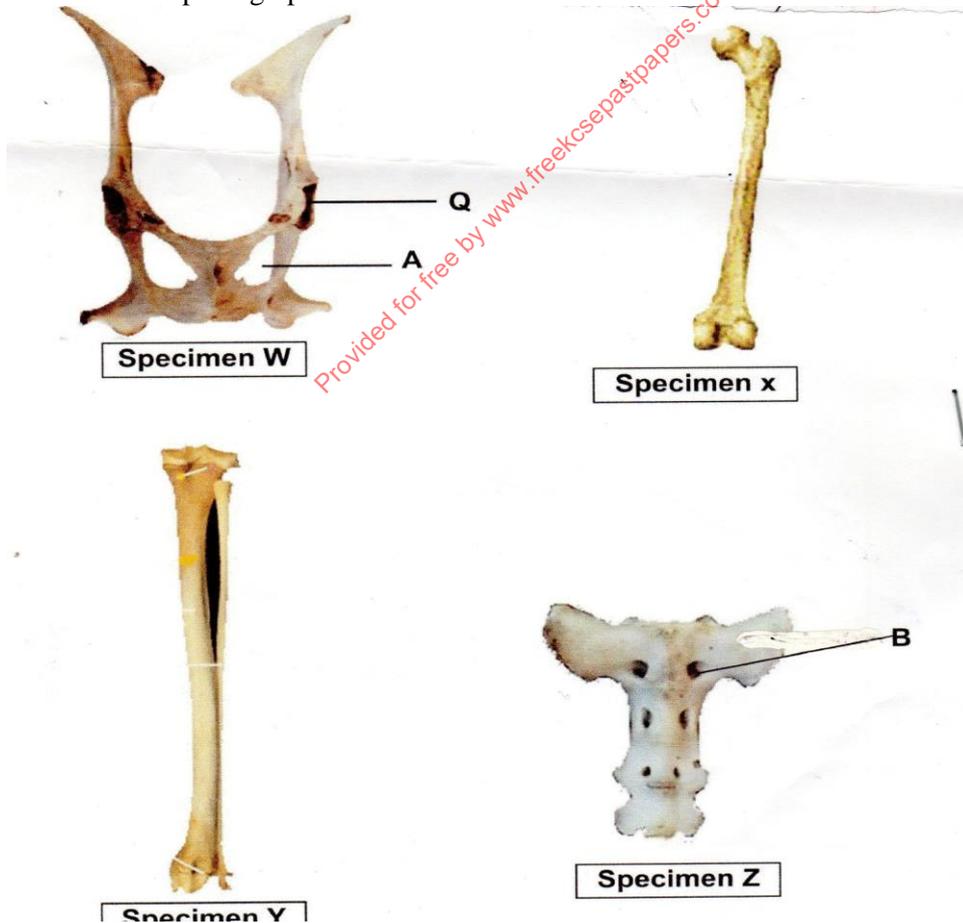
- b) Using the same reagents, test for food substances in liquid L1 in the visking tubing. Record your observation in the table below. (2mks)

Food substance	Procedure	Observation	Conclusion
----------------	-----------	-------------	------------

- c) Account for the results obtained after carrying out tests for liquid L1 before and after immersion into liquid L2. (4mks)
- d) State two roles of the physiological process involved above in animals (2mks)
2. a) Study the photographs below for specimen R and S.



- i) State two observable differences between the specimen R and S. (2mks)
- ii) Suggest the advantage of the adaptations on the limbs of specimen S (2mks)
- b) i) Name the phylum and the class to which the specimens belong (2mks)
- Phylum (2mks)
- Class (2mks)
- ii) State two distinguishing features found in the members of the phylum and class stated in b (i) above. (2mks)
- c) i) Give two differences between complete and incomplete metamorphosis (2mks)
- ii) State the specimen that exhibits. (2mks)
- i) Complete metamorphosis (1mk)
- ii) Incomplete metamorphosis (1mk)
3. Below are photographs of a skeleton of a mammal.

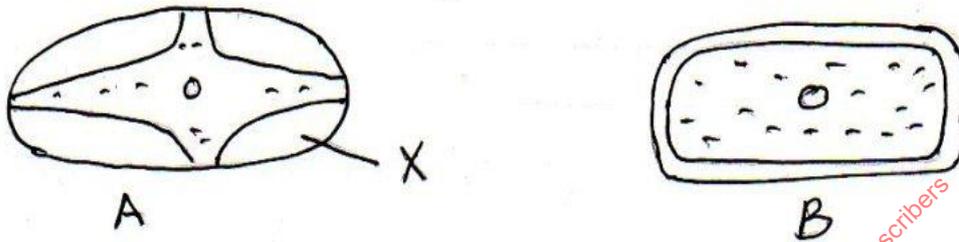


CEKENA MOCKS

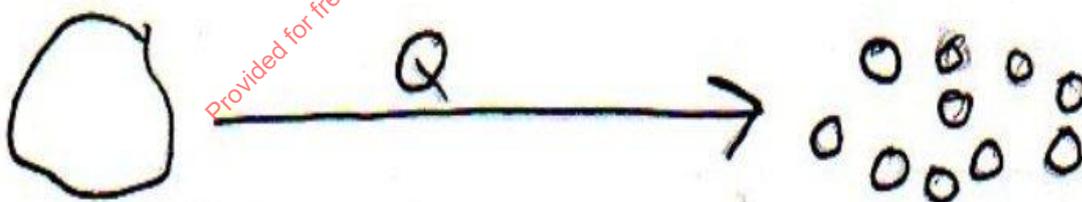
231/1

BIOLOGY PAPER 1

1. What is meant by the following terms (3 mks)
 - a) Hypogynous
 - b) Gamosepalous
 - c) Dichogamy
2. a) State two ways how protection of the heart against mechanical injury is achieved during heart beat. (2 mks)
- b) State three causes of arteriosclerosis (3 mks)
3. The cells shown below were obtained from two different plant cells which were immersed in 2% and 25% salt solution.

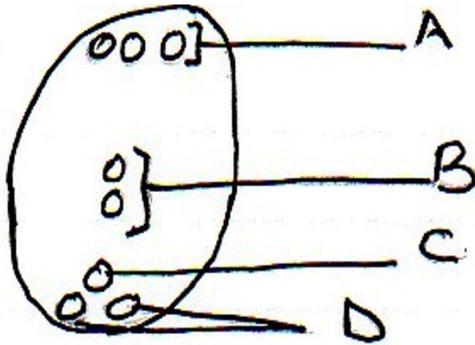


- a) Which of the two cells A and B was immersed in 2% salt solution (1 mk)
- b) Name the solution present in part marked X (1 mk)
- c) Comment on the nature of 25% salt solution in relation to the cell sap (1 mk)
- d) What biological phenomenon leads to the observation made in A (1 mk)
4. Name the enzyme in the red blood cell that speeds up the conversion of carbonic acid to carbon (IV) oxide. (1 mk)
5. a) Under which of the following light microscope magnification would one see a larger part of specimen X40, X400 (1 mk)
- b) Give a reason (1 mk)
6. Give two reasons why blood leaving the lungs may not be fully oxygenated (1 mk)
7. Highlight differences between anemophilous and entomophilous pollinated flower (2 mks)
8. Explain how high humidity lowers the rate of transpiration (2 mks)
9. Explain the disadvantage of anaerobic respiration in plant root. (2 mks)
10. The diagram below represent a process that occur in the alimentary canal



- i) Identify the process Q (1 mk)
- ii) Give the significance of the above mentioned process (1 mk)
11. a) State one advantage of heterodonts over homodonts. (1 mk)
- b) A certain animal was found to have the following number of teeth on the upper jaw- six molars, six premolars, no canine and incisors and on the lower jaw, six incisors, two canines, six premolars and six molars.
 - (i) Write the dental formular of the above animal. (2 mks)
 - (ii) What is the likely diet of the animal (1 mk)
12. A girl has blood group AB
 - (a) Give the antibodies found in the red blood cells of her blood. (1 mk)
 - (b) What make the girl a universal recipient (1 mk)

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

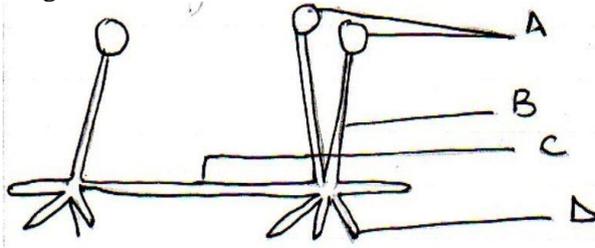


- a) Name the parts (3 mks)
 - b) what is the function of the structure labeled B (1 mk)
14. Explain why athletes train in high altitude in preparation for competition (2 mks)
15. State the importance of each of the following steps when testing for non-reducing sugars
- i) Boiling food sample with dilute hydrochloric acid (1 mk)
 - ii) Adding sodium hydrogen carbonate to the mixture of food sample with dilute hydrochloric acid. (1 mk)
16. a) i) What is meant by the term biological control (2 mk)
- ii) Give an example of biological control (1 mk)
- b) i) What is eutrophication (3 mks)
17. a) Name the causative agent of the following diseases in human (2 mks)
- i) Typhoid
 - ii) Amoebic dysentery
- b) Name the disease in human caused by *Plasmodium falciparum* (1 mk)
18. a) Name a fluid that is produced by sebaceous gland of a mammal (1 mk)
- b) What is the role of sweat on human skin? (2 mks)
19. State the importance of the following process that take place in the nephron of a human kidney.
- a) Ultrafiltration (2 mks)
 - b) Selective reabsorption (1 mk)
20. State the name given to the study of (3 mks)
- a) Cells
 - b) Insects
 - c) Birds
21. The diagram below represents a female cone



- a) Name the subdivision to which the plant belongs (1 mk)
 - b) Other than cone name two other external features that identify plants in this subdivision (2 mks)
22. Name three sites of gaseous exchange in terrestrial plants (3 mks)
23. Name two hormones that control sugar level in man (2 mks)
24. State two roles of pancreas in man (2 mks)

25. The diagram below shows a bread mould.



- a) Name the kingdom which the organism below (1 mk)
 - b) Name the parts labeled A, B, and C (3 mks)
 - c) Explain how part labeled D obtain nutrients (3 mks)
26. Below is an example of a food chain
 Nappier grass → Mouse → Snake → Hawk
 Identify the trophic level occupied by;-
- i) a) Nappier grass (1 mk)
 - b) Hawk (1 mk)
 - ii) What would happen if snakes are removed from the food chain? (2 mks)
27. State three characteristics of apical meristem cells (3 mks)

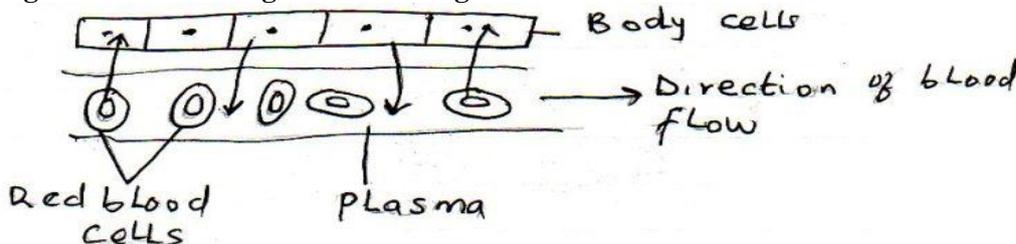
CEKENA
231/2
BIOLOGY PAPER 2
THEORY

SECTION A:40 MARKS
Attempt all the questions

1. The diagram below shows the sequence of hypothetical reaction catalyzed by enzymes.



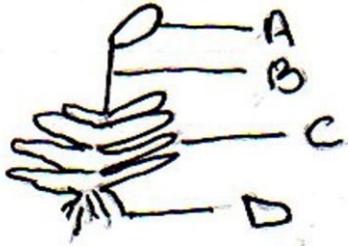
- a) What would happen if enzyme q is inactivated? (2 mks)
 - b) Given that food product N is a peptide, state the identity of enzyme S (1 mk)
 - c) Explain what would happen in each of the following;
 - i) Increasing concentration of enzyme q (1 mk)
 - ii) Inhibitor introduced that inhibits action of enzyme S. (2 mks)
 - d) List two factors that affect the rate of enzyme action. (2 mks)
2. The diagram below shows gaseous exchange in a tissue



Name the gas that diffuses;

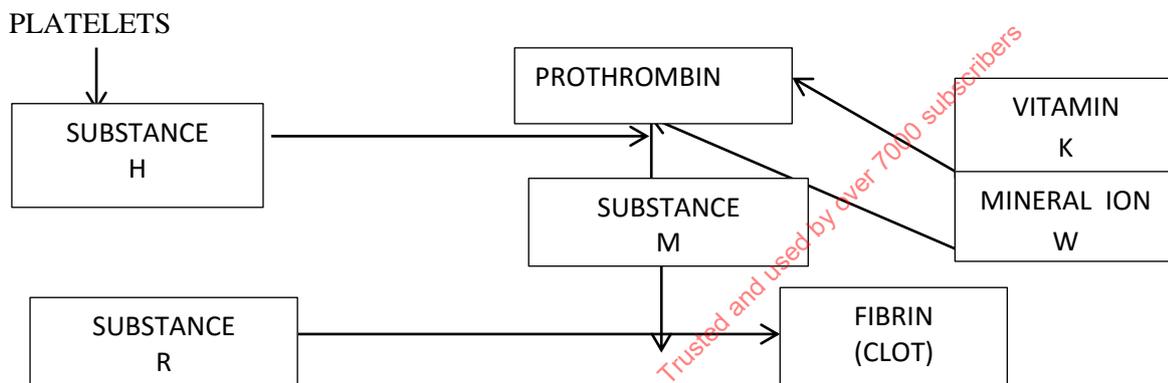
- a) Into body cells (1 mk)
- b) From body cells (1 mk)
- c) Which compound dissociates to release the gas named in (a) above? (1 mk)
- d) i) What is a tissue fluid? (2 mks)
- ii) What is the importance of a tissue fluid? (1 mk)
- e) In which forms is carbon (IV) oxide transported? (2 mks)

3. The diagram below represents a plant.



- a) i) Name the kingdom to which the plant belongs. (1 mk)
- ii) Give two characteristics of this kingdom not shown in the diagram above (2 mks)
- b) Name the parts labeled B and D (2 mks)
- c) State the functions of parts A and C (2 mks)
- d) Name the division the plant belongs (1 mk)

4. The flow chart below represents the process that occurs before blood clots. Study it and answer the following questions.



- a) Name substances H, M, R and mineral ions W (4 mks)
 - b) State the conditions necessary for the occurrence of substance H (2 mks)
 - c) State the biological importance of blood clotting in animals. (2 mks)
5. a) Suggest two reasons why cross pollination is considered advantageous over self-pollination? (2 mks)
- b) State three mechanisms in plants that prevents self pollination (3 mks)
 - c) What are the functions of the following in mammals? (3 mks)
 - i) Seminiferous tubules
 - ii) Oviduct
 - iii) Prostate gland

SECTION B:

Question 6 (compulsory), answer question 7 or 8 on spaces provided after question 8

6. The data below shows the difference between the blood of a pregnant woman and that of the foetus developing in her womb.

Partial pressure of oxygen in Kpa	% Saturation	
	Mother %	Foetus %
1.3	8	10
2.7	20	30
3.9	40	60
5.3	65	77
6.6	77	85
8.0	84	90
9.3	90	92
10.6	92	92

- a) (i) Plot the data on a graph of percentage saturation against partial pressure of oxygen (8 mks)

- ii) Explain why oxygen dissolution curve for the foetus is found on the left of the mother. (2 mks)
- iii) From the graph determine the percentage saturation of blood with oxygen when the partial pressure of oxygen is 5.0kpa for the foetus haemoglobin and mother's haemoglobin. (2 mks)
- Foetus haemoglobin
- Mother's haemoglobin
- iv) Explain why curves level off beyond the partial pressure of oxygen of 10.6kpa (2 mks)
- b) i) Draw a diagram and label it to show the side view of an erythrocyte. (3 mks)
- ii) Explain three adaptations of the erythrocytes to their functions. (3 mks)
7. How do abiotic factors affect plants? (20 mks)
8. Describe how carbon (IV) oxide produced by respiratory liver cells reaches the alveoli cavities in mammalian lungs (20 mks)

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231/3 BIOLOGY PAPER 3

PRACTICAL

JULY 2019

Each candidate will require the following:

- Egg albumen (one egg) and glucose (20) dissolved in a litre of distilled water labelled **Solution A**. Each candidate require 10ml
- Egg albumen (one egg) dissolved in a litre of distilled water labeled **Solution B**. Each candidate require 10ml
- Access to 2% copper II Sulphate solution
- Access to 10% sodium hydroxide solution
- Access to Benedict's solution
- 6 test tubes
- Test tube holder
- Means of heating / Bunsen burner
- Black jack leaf with leaflets labelled P
- Zebrina leaf with sheath intact labelled Q
- Kikuyu grass leaf with sheath intact labelled R

CEKENA MOCKS

231/3

BIOLOGY PAPER 3

PRACTICAL

1. You are provided with two **solutions A** and **B**. Divide the **solution A** into two equal portions each of which will be used for a food test in the table below.
- Divide the **solution B** into two equal portions each of which will be used for a food test in the table below.
- a) Using the reagents provided carry out food tests to determine the food substance present in solutions A and B in each of the test tubes. In each case, record the food substance tested for, procedure followed, observation and conclusion made in the table below. (10mks)

Solution	Food substance	Procedure	Observation	Conclusion
A				
B				

- b) i) Which of the two solutions would be appropriate to an athlete after a race? (1 mk)

- ii) Give a reason for your answer in (b) (i) above. (1 mk)
- c) Name the enzyme which starts the digestion of the food substance in solution B in the human alimentary canal (1 mk)
- d) State one way in which the food substance in solution B is important to living organisms.
- e) Explain the role of the two substances produced by the organs labeled 4 (4 mks)
- f) The structure labeled 2 is a blood vessel. List three structural differences between it and the vessel beside it. (3 mks)

	Blood vessel 2	Blood vessel beside
i)		
ii)		
iii)		

2. You are provided with three types of leaves. Observe them carefully then answer the questions that follow;-

- a) State three differences between leaf P and R other than size. 3mks

	Leaf P	Leaf R
1.		
2.		
3.		

- b) With a reason suggest the likely habitat of leaf Q (2 mks)

Habitat _____
Reason _____

- c) Study the dichotomous key below and answer the questions that follow

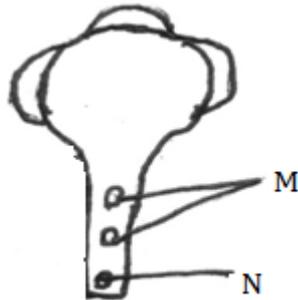
- 1. a. Leaf simple.....go to 2
- b. leaf _____ go to 3
- 2. a. Leaf purple.....*Commelina*
- b. Leaf _____ go to 6
- 3. Leaf with smooth margin.....*Phaseolus*
- b. _____ go to 4
- 4. a. Leaf pinnate.....go to 5
- b. Leaf bi-pinnate.....*Jacaranda*
- 5. a. Leaf trifoliate.....*Bidens*
- b. Leaf with nine leaflets.....*Spathodea*
- 6. a. Leaf with reticulate venation.....*Mangifera*
- b. Leaf with parallel venation.....*Pennisetum*

- (i) Fill in the blank spaces to complete the dichotomous key above (3 mks)
- (ii) Use the key to identify each of the leaves. (6 mks)

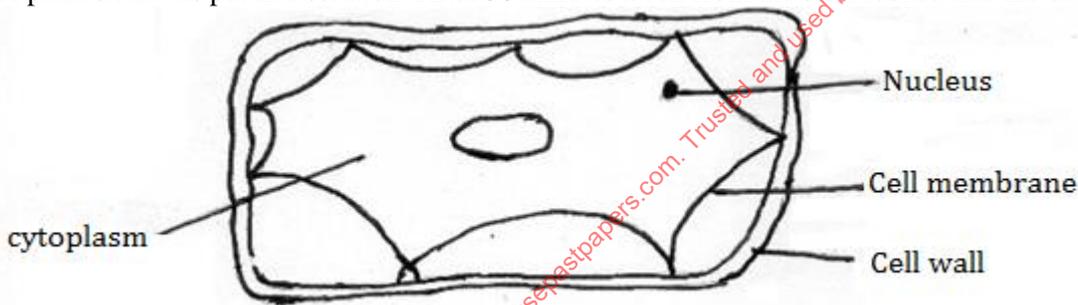
Leaf	Steps	Identify
P		
Q		
R		

CEKENA MOCKS
FORM 4 END OF TERM TWO JOINT EVALUATION TEST 2019
231/1
BIOLOGY
PAPER 1

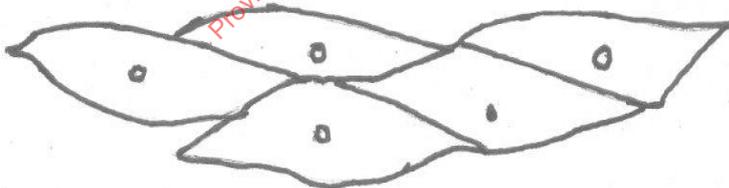
1. a) Name two raw materials in the process of photosynthesis (2mks)
 b) State the importance of photosynthesis in nature (2mks)
2. Name three forces involved in transportation of water and mineral salts up the stem (3mks)
3. The diagram below shows a pollen tube as it grows down the style



- a) Name the parts labelled (2mks)
 b) State the functions of the part labelled M (3mks)
4. A plant stem was put in a solution. After 30 minutes a cell from the stem looked like the one drawn below;



- i) State the type of solution the stem was put in (1mk)
 ii) What term is used to describe the cell (1mk)
 iii) Explain what happened (3mks)
5. The diagram below shows a muscle tissue

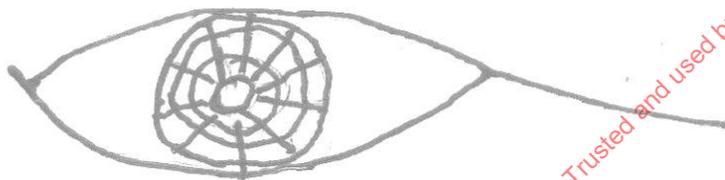


- i) Name the muscle (1mk)
 ii) State three organ systems where the muscle is found (3mks)
6. Explain why starchy food turns sweet if kept in the mouth for long (2mks)
7. State the use of the following apparatus (2mks)
 - i) Bait trap
 - ii) Pit fall trap
8. Give reason for each of the following:-
 - (a) Constant body temperature is maintained in mammals (2mks)
 - (b) Low blood sugar level is harmful to the body (2mks)
9. a) Name the gaseous exchange system in an insect (1mk)

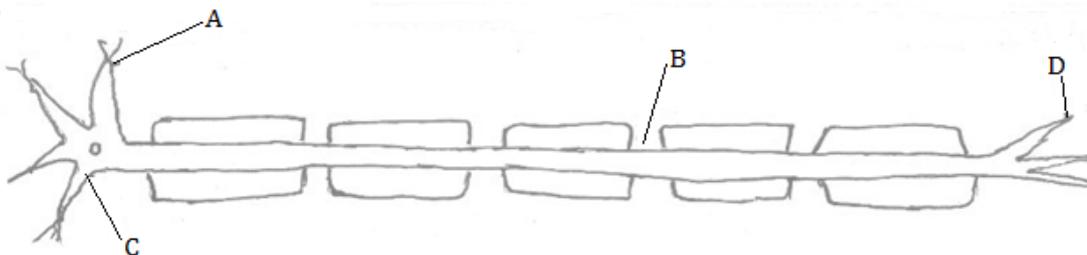
- b) Explain why it greatly differs with that of a human being (2mks)
10. a) Define the term organic evolution (1mk)
- b) Give two examples of vestigial structures in man (2mks)
11. Below is a diagram of a moss



- a) Classify the moss into kingdom and division (2mks)
- b) State the function of the part labeled A (1mk)
- c) State two functions of the part labeled K (2mks)
12. Name the cell organelle where
- i) Ribosomes are made (1mk)
- ii) Energy is produced (1mk)
13. a) Differentiate between a population and a community (2mks)
- b) What is a food chain? (1mk)
14. The diagram below shows the front part of the human eye



- a) Explain the changes that would occur if the person walked into a dark room (3mks)
- b) State the significance of the changes you mentioned in (a) above (1mk)
15. State two human characteristics controlled by genes found in the Y-Chromosome (2mks)
16. An aeroplane use fuel to create energy for movement. It produces carbon (IV) oxide and other gases. It is not classified as an organism. State three characteristics of living things not shown by an aeroplane (3mks)
17. A shoot of a seedling exposed to light on one side bend towards the source of light as it grows.
- a) Name the response exhibited by the shoot of the seedling (1mk)
- b) Explain how the bending towards the source of light occurs (3mks)
18. a) Explain three major roles of water during seed germination (3mks)
- b) Why do cotyledons turn green after germination (1mk)
- c) State two characteristics of cells in meristematic tissue (2mks)
19. State three differences between anaerobic and aerobic respiration (3mks)
20. Suggest three reasons why green plants are included in fish aquarium (3mks)
21. State the role of each of the following hormones in process of reproduction in a male human
- a) Folicle stimulating hormone (1mk)
- b) Luteinising hormone (1mk)
22. Study the diagram below and answer the question that follow



- a) Name the parts (3mks)
- b) State the function of the part labeled B (1mk)

23. State the mode of asexual reproduction exhibited by the following organisms (3mks)

- i) Yeast
- ii) Mushroom

24. State the name given to the study of birds (1mk)

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FORM 4 END OF TERM TWO JOINT EVALUATION TEST 2019

231/2

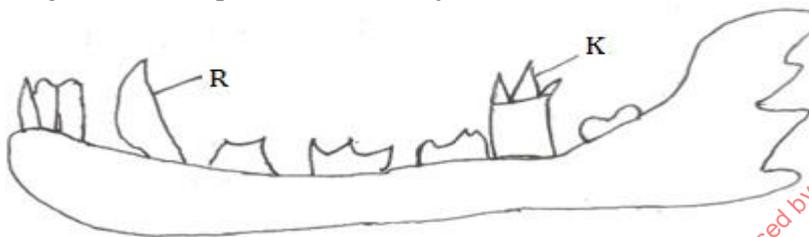
BIOLOGY

PAPER 2

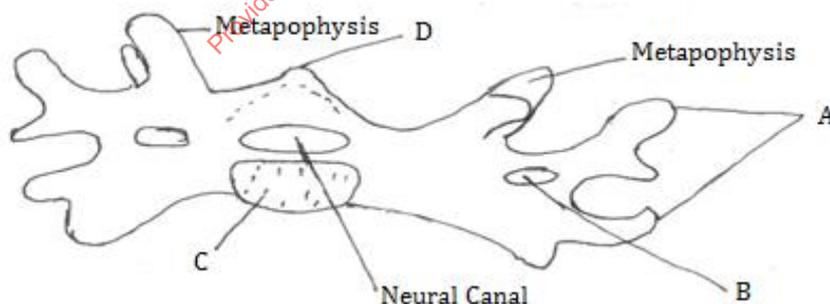
SECTION A:(40MARKS)

Answer ALL the questions in this section

1. The diagram below represents the lower jaw of a mammal.

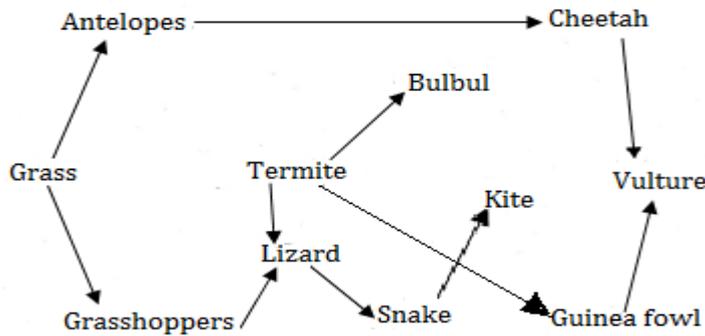


- a) i) Name the mode of feeding of the mammal whose jaw is shown (1mk)
 ii) State two evidence to support your answer in (i) above (2mks)
 - b) State the function of the tooth labeled R. (1mk)
 - c) Explain two adaptations of the tooth labeled K to its functions (2mks)
 - d) i) What is the name of the toothless gap in the jaw of a ruminant? (1mk)
 ii) State the significance of the gap you have named in (d)i) above (1mk)
2. When true breeding red-flowered rose plant was crossed with a true breeding white flowered plant, the resulting plants produced only pink flowers.
- a) Using appropriate letter symbols make a cross to work out the genotype of the F₂ generation. (4mks)
 - b) State the genotypic and phenotypic ratio of the F₂ generation (2mks)
 - c) Account for the absence of both red and white flowered plant in F₁ (1mk)
 - d) What is meant by the term allele? (1mk)
3. The diagram illustrates a bone found in a mammal



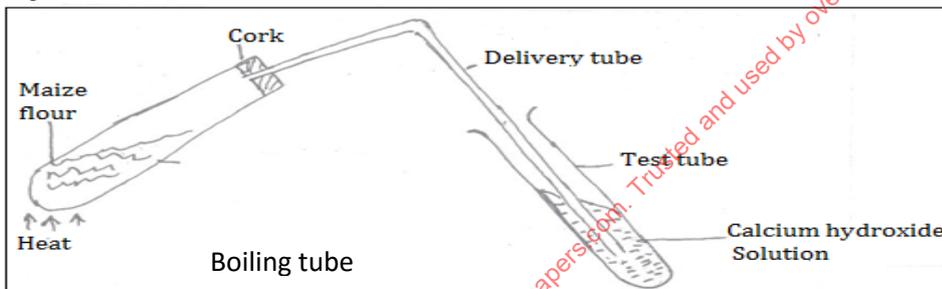
- i) Label the Parts A, B, C and D (4mks)
- ii) Identify the bone (1mk)
- iii) Give one reason for your answer in (ii) above (1mk)
- iv) State the function of the part labeled B (1mk)
- v) Name the part of the skeleton where the above bone can be found (1mk)

4. Below is a food web. Study it and answer questions that follow



- Write two food chains in which the guinea fowls are secondary consumers (2mks)
- Which organism has the largest variety of predators in the food web (1mk)
- Name the tertiary consumer in the food web (1mk)
- Name the organism through which energy from the sun enters the food web (1mk)
- What would be the short term effect on the ecosystem if leopards invaded the area (1mk)
- Suggest two ways in which the ecosystem would be affected if there was prolonged drought (2mks)

5. A set up was done as shown below



- What was the aim of the experiment? (1mk)
- State two observations in the test tube (2mks)
- State an observation in the boiling tube (1mk)
- List two conclusions made at the end of the experiment (2mks)
- A man weighing 90kg requires 200KJ per gram of body weight while a rat weighing 50g requires 2500KJ per gram of body weight. Explain (2mks)

SECTION B:(40MARKS)

Answer question 6 (Compulsory) and any other one question, either 7 or 8.

6. A form two class wanted to study population growth in mice. Twenty young mice were put in a cage and were provided with 3kg maize flour daily for a period of one year.

The results were as shown below

Time in months	0	2	4	6	8	10	12
No. of Mice	20	20	30	45	40	25	10

- On the graph paper provided draw a growth of mice population against time (6mks)
- Account for the mice population in the first two months (3mks)
- State the factors that were kept constant throughout the time of study (2mks)
- After what time interval was the population determined? (1mk)
 - Which method was used to determine the population of the mice (1mk)
- Account for the population change between the 8th and the 12th month (3mks)

- f) What was the population of mice on the fifth month? (1mk)
 g) How does the sex-ratio in animals determine population growth? (2mks)
 h) What is population growth rate? (1mk)
 7. Describe the mechanism of breathing in man (20mks)
 8. Describe how fruits and seeds are suited to their modes of dispersal (20mks)

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FORM 4 END OF TERM TWO JOINT EVALUATION TEST 2019
BIOLOGY PRACTICAL
PAPER 3
231/3
CONFIDENTIAL

Requirements

1. 6ml of solution B in a 50ml beaker
 - Benedict's solution
 - DCPIP
 - Sodium hydroxide solution
 - Copper (II) sulphate solution
 - Ascorbic acid powder + pure honey
 - Means of heating
 - 3 test tubes
 - Test tube holder
 - Tripod stand
 - Wire gauze
 - Glass beaker

Preparation of solution B

Measure 20ml of pure honey, dissolve it in 1litre of distilled water and then add 10g of ascorbic acid powder, stir until all of it dissolves.

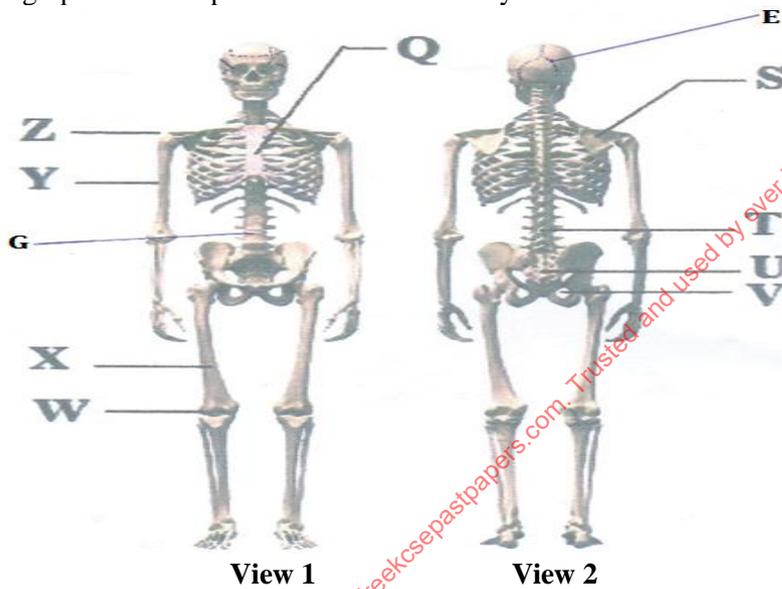
N/B – Solution B should be prepared the morning of the practical exam.

2. Teeth
 - Premolar labeled J
 - Molar labeled K

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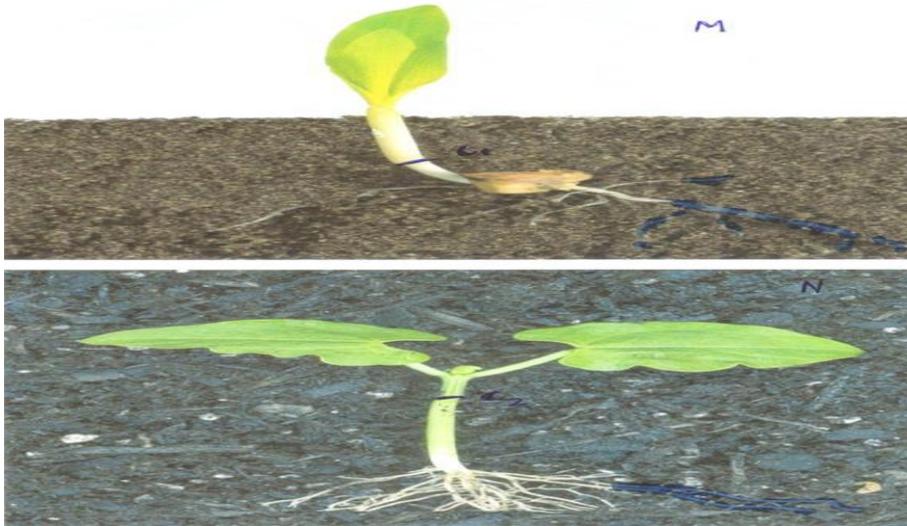
CEKENA MOCKS
FORM 4 END OF TERM TWO JOINT EVALUATION TEST 2019
231/3
BIOLOGY
PAPER 3
PRACTICAL 231/3

- Q1. a) You are provided with a solution labelled B. Using 2ml of solution B in each test and the reagents, and apparatus provided, identify the food substances in solution B. Record your results in the table below. (9mks)
- b) You are provided with specimens J and K obtained from a herbivorous mammal, use them to answer the questions which follows
- i) With a maor observable reason identify
 Specimen J (2mks)
 Identity
 Reason
- ii) Draw a large well labelled diagram of specimen K (3mks)
- Q 2. The photographs below represent human skeletal system. Use it to answer the questions that follow.



- a) Name the parts labeled (5mks)
- S _____
- Q _____
- U _____
- X _____
- V _____
- b) i) Name the types of joints labeled E and G (2mks)
- ii) What is the difference between the type of joints labeled, E and G (3mks)
- c) Give three functions of the Endoskeleton (3mks)

Q 3. Study the photographs M and N below and answer the questions that follow



- a) i) State the class to which specimens M and N belongs (2mks)
 ii) Using one major observable features only, give reasons for your answer in a (i) above. M & N (2mks)
- b) Indicate using letter X where mitosis would take place at the highest rate on photograph N. (1mk)
- c) Sketch a cross section of what would be revealed if a thin section of M and N are observed under a light microscope at C₁ and C₂. Label any three parts common in both cross sections of M and N (5mks)
- d) Sketch a cross section of a root of N and label any three parts that are only found in the root. (4mks)

CEKENA MOCKS

FORM 4 END OF TERM TWO JOINT EVALUATION TEST 2019

MARKING SCHEME

BIOLOGY

PAPER 1

231/1

1. a) Water;
Carbon (IV) oxide;
- b) Production of food;
Reduce Carbon (IV) oxide/increase oxygen in atmosphere;
2. Transpiration pull;
Capillarity;
Root Pressure;
Adhesion and cohesion force;
3. a) M- polar nuclei;
N- Tube nucleus;
- b) One of the male nuclei fuse with the egg cell; to form a diploid zygote; the other male nucleus fuses with the polar nuclei; (to form a primary endosperm nucleus)
4. i) Hypertonic solution;
ii) Plasmolysed cell;
iii) Water molecules moved out of the cell by osmosis; due to hypertonic solution; therefore the cell membrane detached from the cell wall;
5. i) Smooth muscle;
ii) Reproductive system;
Digestive system;
Circulatory system;
6. The polysaccharide/starch which is not sweet is digested by salivary amylase; to maltose which is a sweet disaccharide;
7. i) For attracting and trapping animals;
ii) For catching small crawling animals;

COMPLIANT 231/1

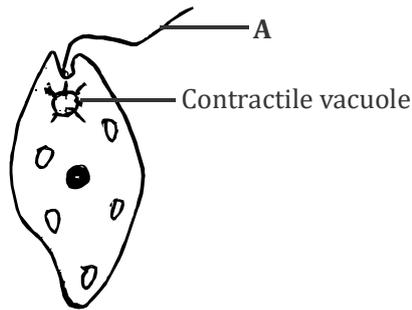
BIOLOGY

Paper 1

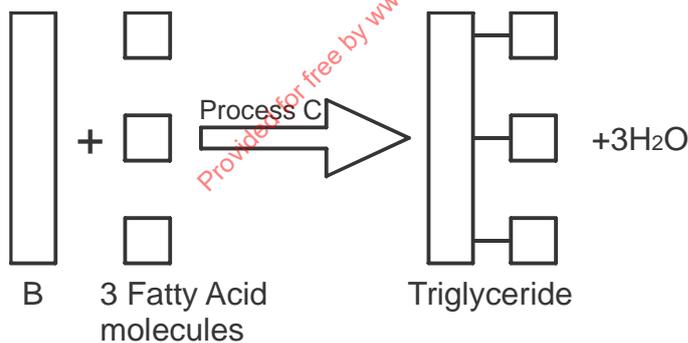
(Theory)

FORM FOUR END OF TERM TWO EXAM 2019

1. A Form one student counted eight cells across a field of view of a light microscope whose diameter was 3.0mm. Calculate the size of one cell in micrometers. (show your working) (2 marks)
2. a) In a blood test, a few drops of antiserum were added to two samples of blood. No agglutination occurred. What were one blood groups of the two samples? (2 marks)
 b) What are possible genotypes of the blood groups name din 2(a) above ? (2 marks)
3. Below is a diagram of unicellular organism.

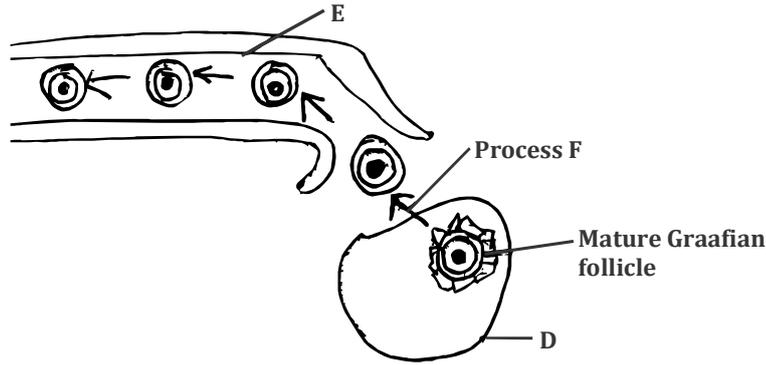


- a) i) Name the part labelled A. (1 mark)
 ii) Give the organelle that forms structure A. (1 mark)
- b) i) To which kingdom does the organism belong? (1 mark)
 ii) Give a reason for your answer in b(i) (1 mark)
4. a) In view of modern genetics, explain why the Lamarckian theory is unacceptable. (2 marks)
 b) Why is it becoming more difficult to treat malaria using chloroquine ? (2 marks)
5. a) State the importance of the following :
 i) Vitamin B12 (1 mark)
 ii) Iodine (1 mark)
 b) Below is a diagrammatic representation of a biological process.



- i) Name molecule B (1 mark)
- ii) Identify process C (1 mark)
6. Describe one method of excretion in a named unicellular organism. (4 marks)
7. a) Define the following ecological terms :
 i) Habitat (1 mark)
 ii) Carrying capacity (1 mark)
 b) Name two appropriate methods of approximating the population of star grass in grassland. (2 marks)

8. The diagram below shows a process that takes place in the female reproductive system.



- a) Name parts labelled D and E (2marks)
- b) Name process F (1 mark)
- c) Which hormone causes process F. (1 mark)

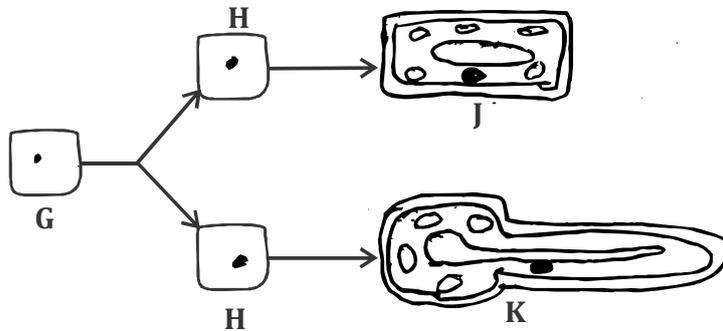
9. In an experiment, the rate of gaseous exchange was determined and recorded as shown in the table below. Using these figures, suggest which plant gaseous structures were responsible for these figures. (3 marks)

Structure	Gaseous exchange in %
A	Approximately 97
B	Approximately 2.5
C	Approximately 0.5

A
B
C

- 10. a) How is the fovea centralis adapted to its function in the human eye. (2 marks)
- b) Name the parts in the human ear responsible for maintaining balance and posture. (2 marks)

11. Study the diagrams below.

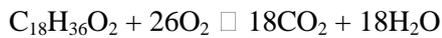


- a) Name the process by which:
 - i) cell G becomes cell H (1 mark)
 - ii) cell H becomes cell J or cell K (1 mark)
- b) State the changes that occurred in cell H for it to be transformed to cell J. (2 marks)

- 12 a) Distinguish between osmosis and diffusion. (2 marks)
 b) State two factors that would hinder absorption of mineral salts. (2 marks)
13. Study the table below and fill the gaps. (4 marks)

Hormone	Source	Function
Antidiuretic hormone		osmoregulation
	Pancreas	lowering blood sugar
Testosterone	Testis	
Ecdysone	Pyrothoracic gland	

14. The equation below represents oxidation of a certain food substance



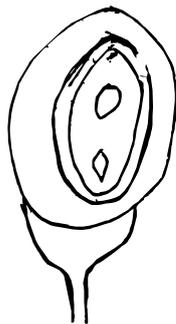
- a) Calculate the respiratory quotient of the substrate being oxidised. (2 marks)
 b) Name the likely food substance being oxidised. (1 mark)
15. The table below shows the number of organisms at various trophic levels.

Organisms	Number
Plants	10,000
Herbivores	800
Carnivore I	150
Carnivore II	20

- a) From the table above, draw a food chain. (1 mark)
 b) Construct a pyramid of numbers for the food chain. (2 marks)
16. a) Name the type of skeleton that makes up each of the following animals. (1 mark)
 i) locust (1 mark)
 ii) bird (2 marks)
- b) What is tail power in fish? (2 marks)
17. The diagram below illustrates changes that occur to a flower after fertilization.



Before fertilisation



After fertilisation

Outline four such changes.

(4 marks)

18. A urine sample from a patient was heated with Benedict's solution. The colour changed to brown.

- b) i) Name the disorder the patient was suffering from. (1 mark)
 ii) Which hormone was deficient in the patient? (1 mark)
 c) Name one kidney disease. (1 mark)

19. When are two organisms considered to belong to the same species. (2 marks)

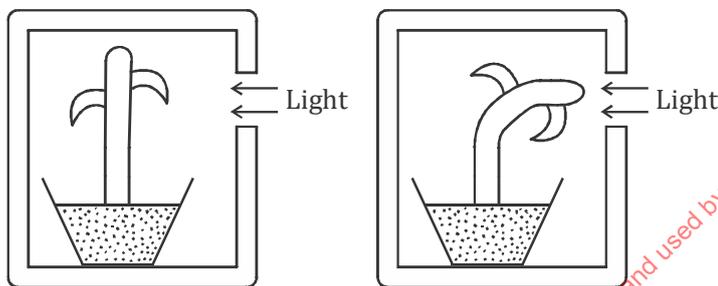
20. Part of one strand of DNA molecule was found to have the following base sequence

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

What is the base sequence of :

- a) The complementary DNA strand. (1 mark)
 b) M-RNA strand copied from this DNA portion. (1 mark)

21. While investigating a certain plant response, learners set up an experiment as shown below.



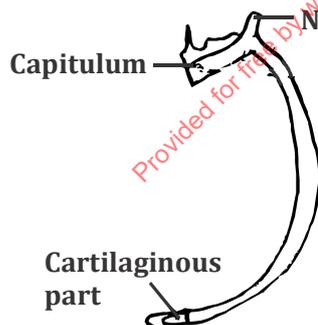
- a) State the response being investigated. (1 mark)
 b) Explain the observation in M. (3 marks)

22. Explain the effect of high humidity on transpiration. (2 marks)

23. a) A certain animal has no incisors, no canines, 6 premolars and 6 molars in its upper jaw. In the lower jaw there are 6 incisors, 2 canines, 6 premolars and 6 molars. Write its dental formula. (1 mark)

- b) State the mode of feeding of the animal. (1 mark)

24. The diagram below shows a mammalian bone.



- a) Name part labelled N (1 mark)
 b) Name the structure that articulates with the cartilaginous part. (1 mark)

CLOMPLIANT MOCKS

231/2

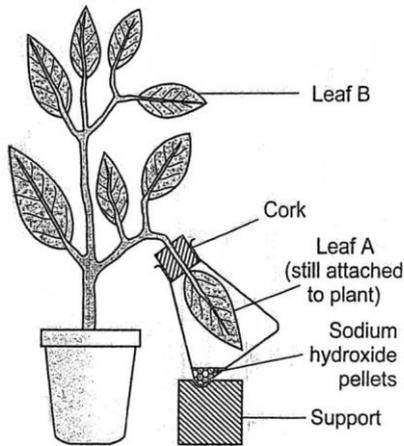
BIOLOGY

Paper 2 (Theory)

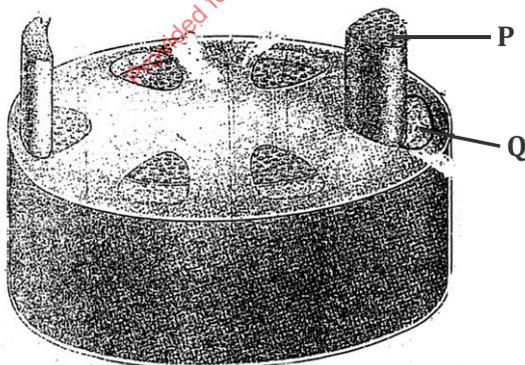
SECTION A : (40 MARKS)

Answer all questions in this section in the spaces provided.

1. An experiment was set up as shown below to investigate a condition necessary for photosynthesis.



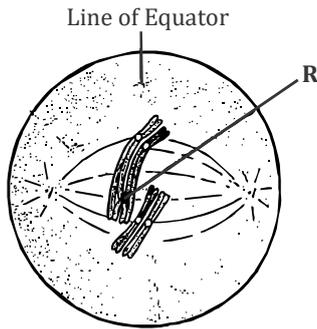
- a) What condition was being investigated? (1 mark)
 - b) What is the role of sodium hydroxide pellets? (1 mark)
 - c) Explain the expected results when leaf A and leaf B are tested for starch. (4 marks)
 - d) Why was leaf B also tested for starch? (1 mark)
 - e) Other than the condition being investigated, name any other condition. (1 mark)
2. Explain how the following are viewed as evidences of evolution. (3 marks)
- a) Ecological isolation. (3 marks)
 - b) Comparative embryology (2 marks)
 - c) Comparative serology (3 marks)
3. The diagram below represents a section of a stem.



- a) i) Name the class from which the section was obtained? (1 mark)
- ii) Give a reason for your answer above. (1 mark)
- b) Label parts P and Q (2 marks)
- P
- Q
- c) i) Name the tissue found between P and Q (1 mark)
- ii) State the function of tissue named. (1 mark)

d) State the role of structure P. (2 marks)

4. The diagram represents a stage in cell division.



- a) Name the stage of cell division in which the cell is undergoing. (1 mark)
- b) i) Name point labelled R (1 mark)
- ii) State the biological importance of crossing over. (1 mark)
- c) Name the structure in a human male where this type of cell division occurs? (1 mark)
- d) State the role of the :
 - i) Sertoli cells (1 mark)
 - ii) Acrosome (1 mark)
- e) Why are testes in mammals found lying outside the body. (2 marks)

5. In certain breeds of mice, a pure breeding black mouse was crossed with a pure breeding white mouse. The offsprings had a coat with white and black strands that appeared grey in colour.

- a) Using letter B to represent the gene for black coat colour and W to represent the gene for white coat colour. Work out the genotype of F2 generation. (4 marks)
- b) What is the phenotypic ratio of F2 generation? (1 mark)
- c) Give one example of a trait in human beings where genes behave in the same as described in (a) (1 mark)
- d) Klinefelter's syndrome is where a person has genotype XXY.
 - i) What is the sex of this person? (1 mark)
 - ii) What is the total number of chromosomes in such a person? (1 mark)

SECTION B : (40 MARKS)

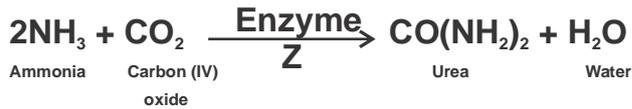
Answer question 6 (compulsory) and either question 7 or 8

6. The surface area to volume ratio of two animals A and B was determined. The amount of urine produced per hour by these animals in a specific habitat was also determined. The results are as shown in the table below.

Time in hours	0	1	2	3	4
A (Ratio 4.0)	1ml	6ml	8ml	7ml	6ml
B (Ratio 2.0)	4ml	2ml	2ml	2ml	2ml

- a) On the same axes, plot the graphs of the amount of urine produced against time. (8 marks)
- b) Name the animal that is likely to be more active at any given time. Give a reason for your answer. (2 marks)
- c) i) Which animal is likely to lose less water in a desert environment? (1 mark)
- ii) Give a reason for your answer. (1 mark)

d) The equation below represents a cycle that occurs in the human body.

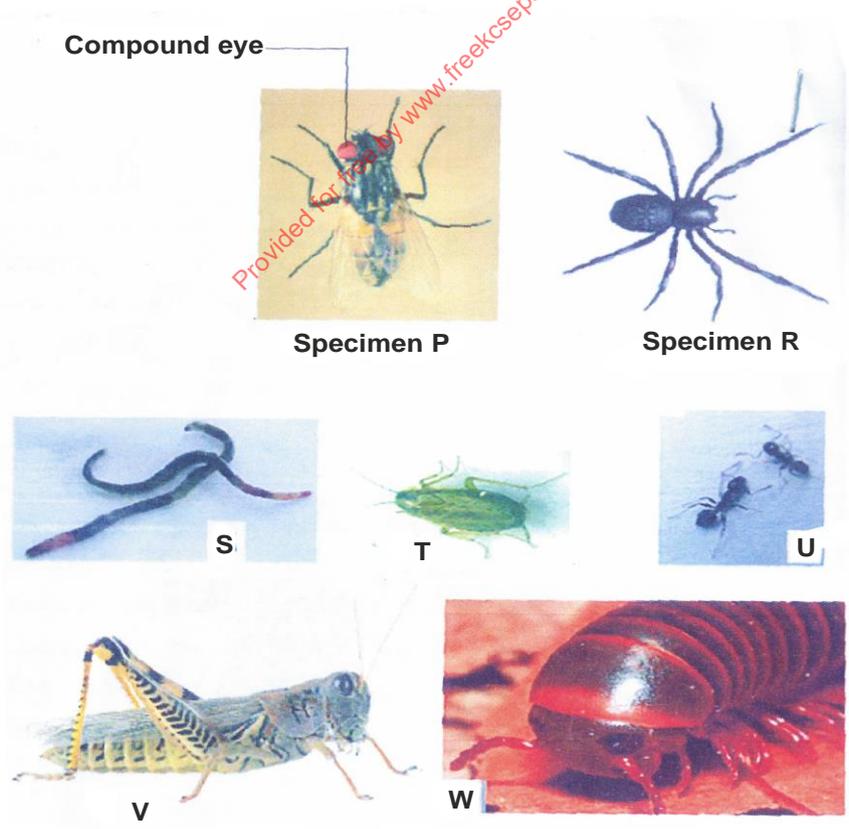


- i) In which organ does the process occur? (1 mark)
- ii) Name enzyme Z (1 mark)
- e) State two advantages which a constant temperature gives mammals and birds over other animals of same phylum. (2 marks)
- f) Explain how the mammalian skin conserves body heat. (4 marks)
- 7. Explain how the various activities of man have caused pollution of air. (20 marks)
- 8. a) Describe the knee jerk simple reflex action. (8 marks)
- b) Discuss ventilation in human lungs. (12 marks)

COMPLIANT
231/3
BIOLOGY
Paper 3

1. You are provided with photographs of the specimen in kingdom Animalia below. Use them to answer the questions below

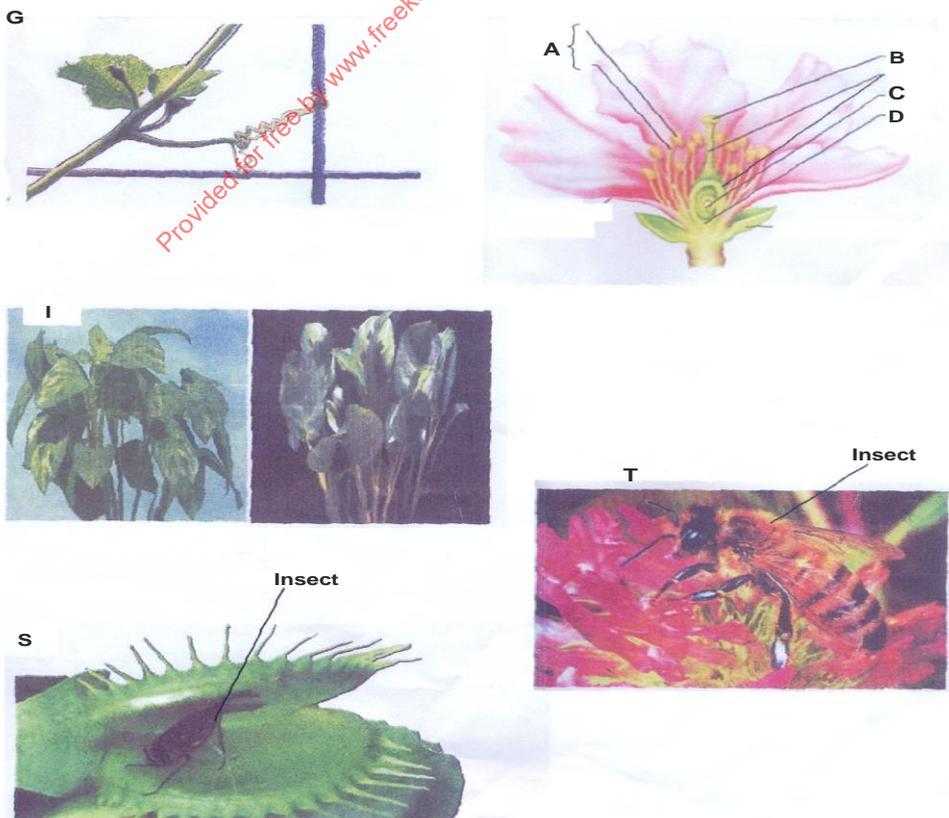
- P - Diptera
- S - Tylenchida
- T - Coleoptera
- U - Isoptera
- V - Orthoptera
- R - Araneae
- W - Siphonocryptida



- a) Construct a dichotomous key using the following characteristics to identify the above organisms into the named orders above. Following the order of the characteristics given below. (6 marks)
- Presence or absence of legs
 - Body shape / form
 - Wings
 - Antennae
 - Leg size (front and hind)
 - Number of legs
- b) State two adaptive features of the specimen labelled V to its habitat. (2 marks)
- c) Give two observable differences between specimen P and R. (2 marks)
- d) Outline the steps followed to identify specimen. (3 marks)

Specimen	Steps
V	
W	
R	

2. a) You are provided with solution P. Using the reagents provided, test for the food substances in solution P. Record the food tested, procedure, observations and conclusions in the table below. (8 marks)
- b) Tie one end of the visking tubing tightly using a thread. Put a 5ml solution P in the visking tubing and tie the open end. Dip it in the beaker containing iodine solution. Leave the set up for 15 minutes and make observations.
- i) Which process was being investigated? (1 mark)
 - ii) Account for observations made. (4 marks)
3. Photographs G, R, I, S and T are plant organs. Photographs S and t show an association with insects. Study them carefully.



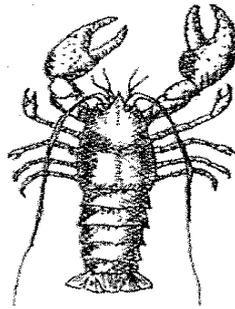
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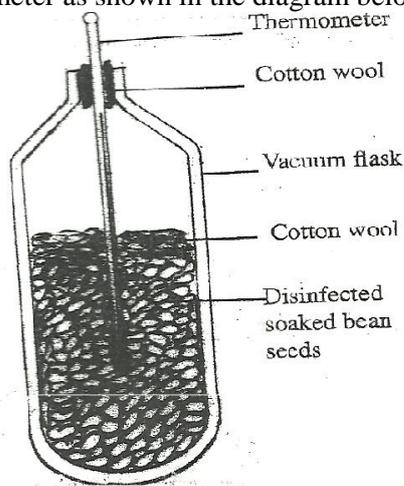
(ii) Biomass

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) -

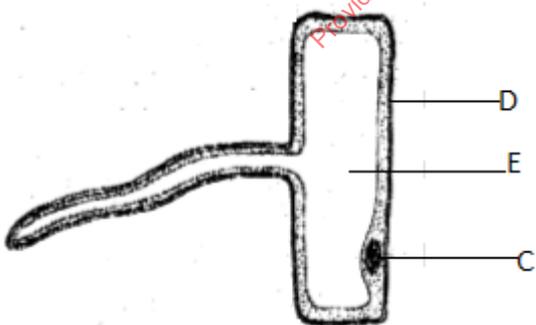
25. In an experiment, disinfection soaked bean seeds were put in a vacuum flask which was then fitted with a thermometer as shown in the diagram below.



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)

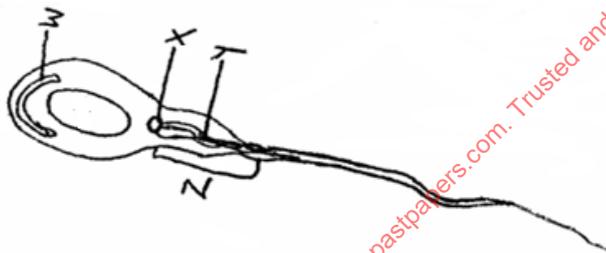
MERU SOUTH
231/2
BIOLOGY (Theory)

SECTION A

2. 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

- Explain the effect of the 0.2 moles per litre sucrose solution on the length of the pieces of the tulip stem. (3mks).
 - 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)
3. Below is a diagram of a sperm cell.



- Identify parts labeled X and Y. (2 marks)
- Explain how parts W and Z adapt the cell to its function. (4 mark)
- Using letter P identify or label on the diagram the part of the cell rich in DNA. (1 mark)
- 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	

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- i) Predator
 ii) Insect.
 iii) Grass.
- f) Name the method used to estimate population of (3mks)
 i). Predator.
 ii. Insect.
 iii. 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)

MERU SOUTH
BIOLOGY CONFIDENTIAL

Each candidate should be provided with the following.

1. 4 test tube.
2. Test tube rack.
3. 2 boiling tube.
4. 2 droppers.
5. 5 spatula of powder Q.
6. 5 spatula of powder R.
7. 1 measuring cylinder.
8. 6 labels.

Access to the following

1. 1% copper (II) sulphate.
2. Sodium hydroxide.
3. Iodine solution.

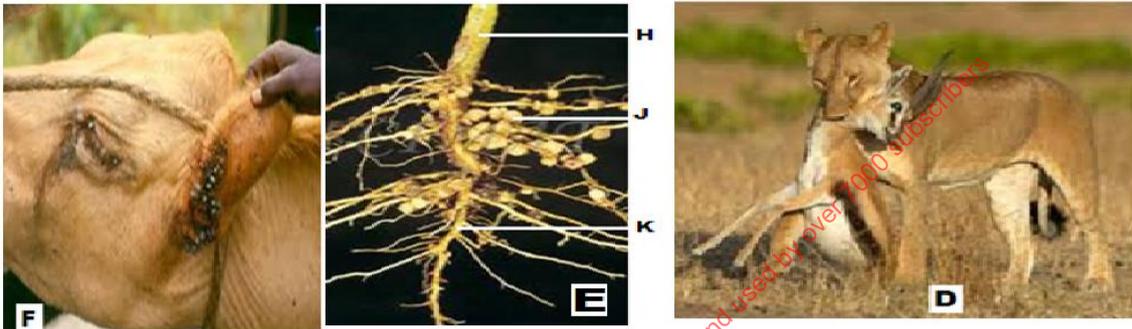
NB: powder Q is wheat flour

Powder R is SIFTED maize flour.

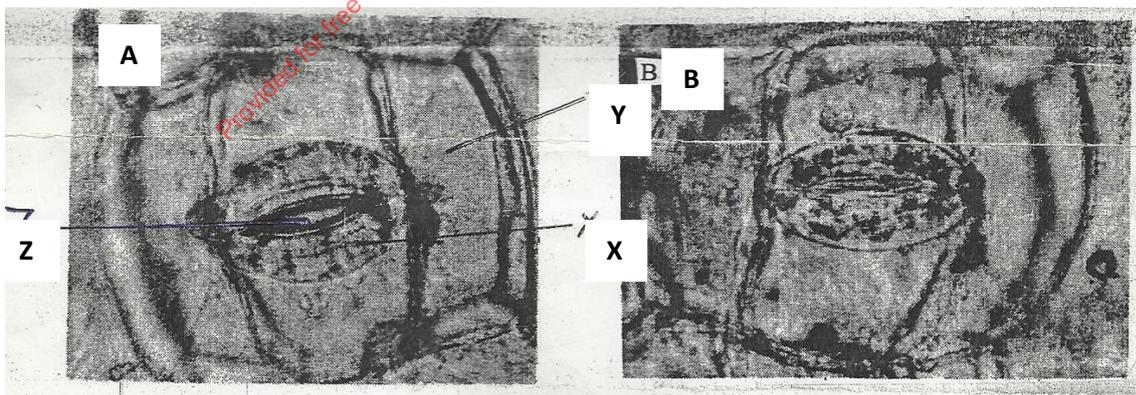
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M SOUTH
231/3
Biology paper 3
(Practical)

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)
 - 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)
 1. State the organ from which each enzyme you have stated in c (i) acts. (2mks)
2. 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)
3. The photographs below show a certain physiological process.



- a) Name the physiological process shown by the photographs. (1Mark)
- b) Name cells X and Y. (2Marks)
- c) How is cell X adapted to function? (2Marks)
- d) i) Name **two** substances that passes through part Z. (2Marks)
 ii) Describe the significance of the process shown by figure A. (2Marks)
- e) State three theories that explain the appearance of figure A and B. (3Marks)

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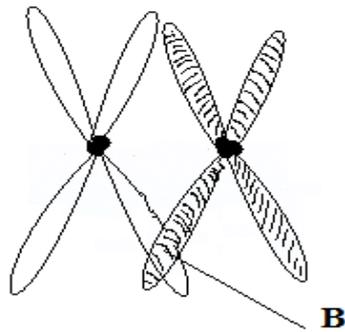
ii) Lungs to heart

(1 mark)

28. Distinguish between natural and acquired immunity.

(2 marks)

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



a) Identify the stage of cell division in which this phenomenon occurs.

(1 mark)

b) State the importance of the phenomenon taking place in the part labeled B.

(2 marks)

30. State two functions of ovaries in humans.

(2marks)

NYANDARUA WEST CLUSTER EXAMINATION

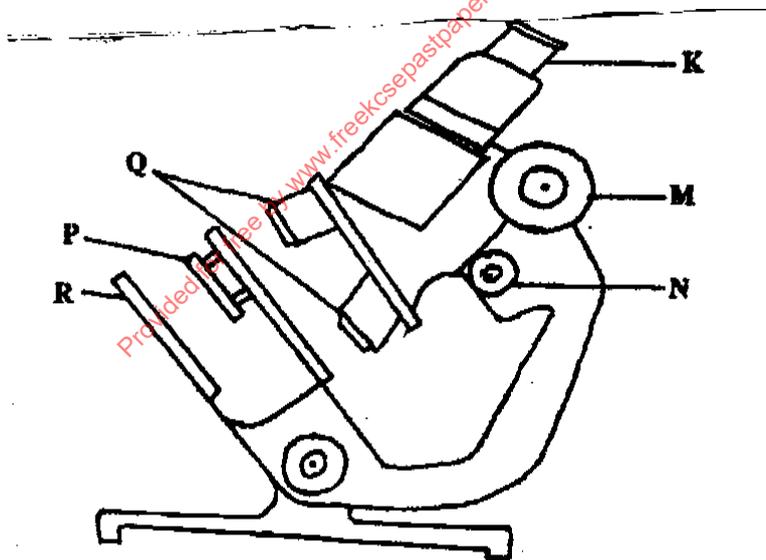
231/2

BIOLOGY

PAPER 2

THEORY

1. The diagram below shows some components of a light microscope.



a) Name the parts labeled

1mks

K –

M –

b) State the functions of

2mks

P –

Q –

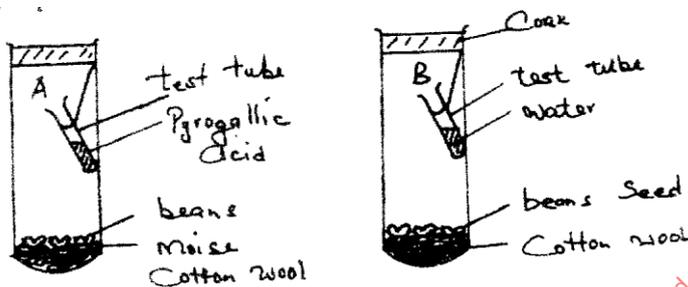
c) A student was viewing a prepared slide of a plant cell under high power microscope. The features of the cell were blurred. Which one of the labeled parts of the microscope would the student use to obtain;-

- i) A sharper outline of the features 1mk
- ii) Give the formula used to calculate magnification in a light microscope 1mk
- d) A student was preparing a section of a plant cell to be viewed on a light microscope. Give a reason for each of the following steps.
 - i) Cutting a very thin section 1mk
 - ii) staining the section 1mk
 - iii) Putting the section in water. 1mk

2. Haemophilia is a sex linked disorder due to a recessive gene. A carrier woman married a normal man. Let **H** represent gene for normal condition and **h** to represent gene for haemophilic condition.

- a) State the genotypes of
 - i) Man 1mk
 - ii) woman 1mk
- b) i), Using a punnet square, show the genotypes of the children resulting from this marriage
- ii) State the probability of getting a carrier daughter. 1mk
- c) Give an explanation why haemophilia is more common in males than in females. 2mks

3. In an experiment a group of students set up the test tubes as shown below



- a) What was the aim experiment? 1mk
- b) Why was pyrogalllic acid included in the gas jar. A? 1mk
- c) What results would you expect in each of the gas jar **A** and **B** at the end of experiment? 2mks
- d) State two artificial ways of breaking seed dormancy. 2mks
- e) Name two hormones that bring about rapid cell division in plants 2mks
- 4. a. i), Distinguish between single circulatory system and closed circulatory system. 2mks
- ii) Name the blood vessels that transports blood from
 - a) small intestines to the liver 1mk
 - b) Lungs to the heart 1mk
- c) i), Name one defect of circulatory system in humans. 1mk
- ii) State three functions of blood other than transport. 3mks

5. An experiment was set up to demonstrate the necessity of carbon (IV) oxide for photosynthesis in a certain green plant as shown below. The plant was first kept darkness for 48 hours before the experiment.



- a) Why was the plant kept in darkness for 48 hours before the start of this experiment. 1mk
- b) What was the role of sodium hydroxide? 1mk
- c) i), What happened to the leaf in the flask when it was tested for presence of starch after the set up was exposed to light for a day?. 1mk

- ii) Give reasons for your answer in (c) I above 2mks
 d) Suggest a control for this experiment. 1mk
 e) Name other two limiting factors in this experiment. 2mks

SECTION B 40MKS

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

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

Time (min)	Temperature 0°c in tube	
	A	B
0	80	80
5	54	67
10	40	59
15	29	52
20	21	47
25	18	46

- a) On the same axis, plot graphs of water temperature against time (min) 8mks
 b) Find the rate of cooling in **A** 1mk
 c) Why was test **B** included in the set up? 1mk
 d) Name two ways through which heat is lost in tube **B**. 2mks
 e) State the expected results if tube **A** was insulated. 1mks
 f) Name the structures in the following organisms that would insulate heat loss.
 i) Birds 1mk
 ii) Mammals 1mk
 g) Name any two receptor cells on the skin of man. 2mks
 h) Describe the response of hair on the skin during cold weather. 3mks
7. a) Describe gaseous exchange in alveolus. 8mks
 b) Describe the process of exhalation in mammals. 8mks
 c) Discuss the characteristics of gaseous exchange sites in an animal. 4mks
8. Discuss the nitrogen cycle. 20mks

NYANDARUA WEST CLUSTERS EXAM

231/3

BIOLOGY**PAPER 3****Practical**

1. You are provide with a food solution mixture labeled Y. you are also provided with the following reagents. 1% copper (II) sulphate solution, 10% sodium hydroxide solution, 0.1% DCPIP solution and a filter paper. Carry out tests to determine the food substances present in Y (12 marks)

Food substance being tested	Procedure	Observation	Conclusion

2. The Diagram below shows two organisms (R and S) belonging to the same phylum

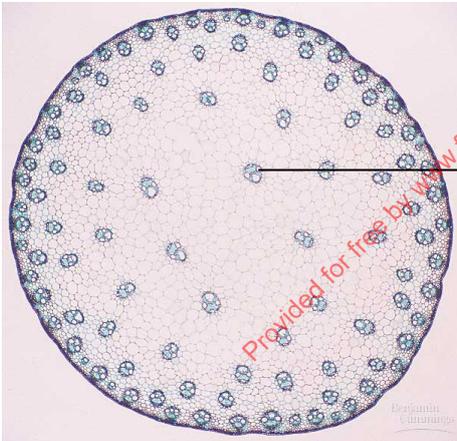


R



S

- (a) Name the class in which the organisms shown above belong. (2 Mark)
- i) Organism R
 - ii) Organism S
- b) Other than presence of exoskeleton, list **two** observable similarities between the two organisms (2 Marks)
- c) List **two** observable differences between the two organisms (2 Marks)
- d) Explain how the organism labelled P is adapted to safeguard itself from the predator (2 Marks)
- e) (i) Name the gaseous exchange system exhibited by organism S (1 Mark)
- ii) State the respiratory surface used by organism S (1 Mark)
- f) Discuss **four** functions of exoskeleton (4 Marks)
3. The following micrographs show images taken from a transverse section of a various stems by a light microscope. Analyze them closely and use them to answer questions that follow.



A

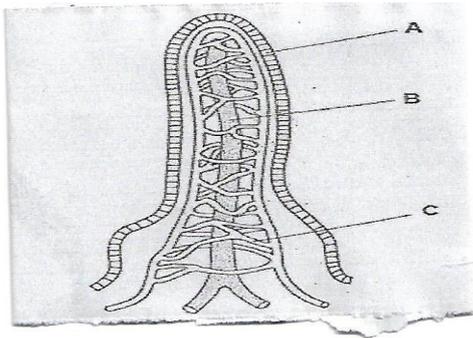
T

Q

KANDARA MOCK
FORM 4 END OF TERM 2 EXAMINATION
231/1

BIOLOGY PAPER 1

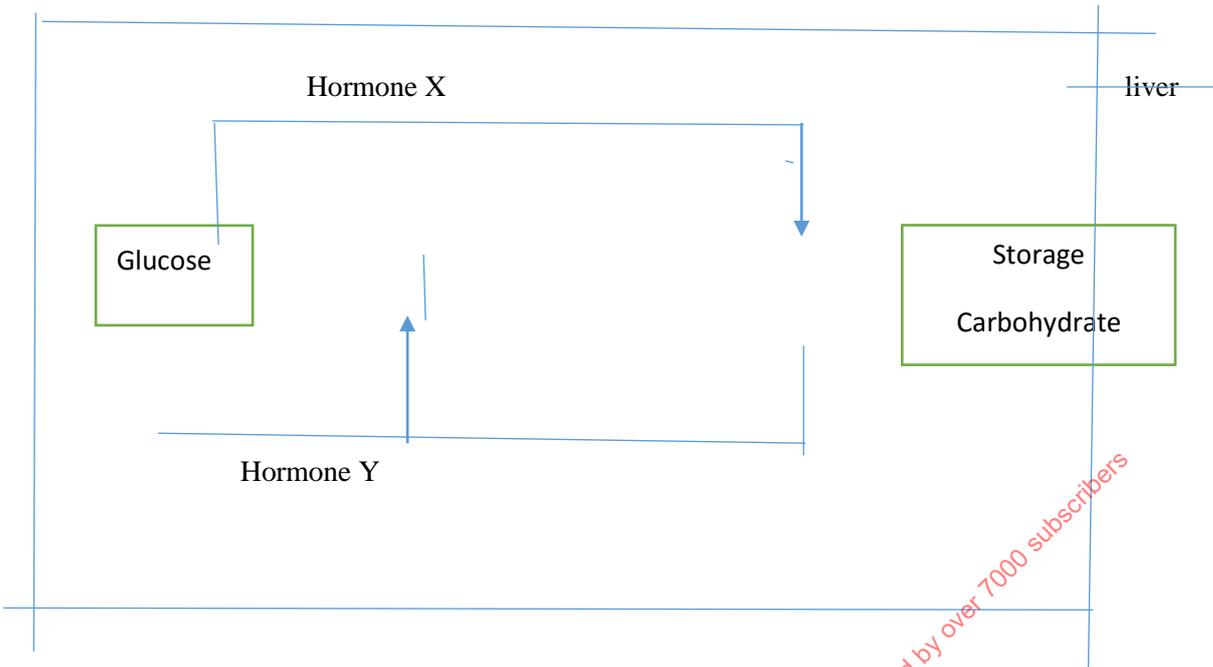
1. Differentiate between locomotion and movement. (2mks)
2. (a) Identify the organelle that is likely to be most abundant in the phagocytes. (2mks)
 Explain. (2mks)
 (b) State the function of:
 - (i) Grana of chloroplasts. (1mk)
 - (ii) Golgi vesicles. (1mk)
3. The diagram below represents a villus of the human alimentary canal.



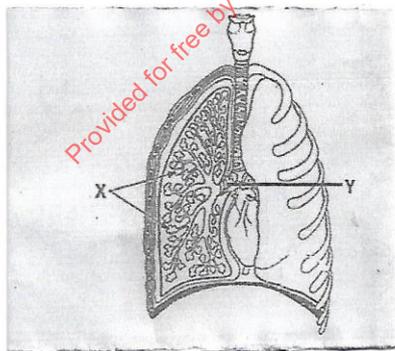
- (a) Name the substances that are absorbed through the structures labelled B and C. (2mks)
- (b) State one adaptation of the carnassial teeth in carnivores. (1mk)
4. Explain why the lens and the mirror should not be touched with fingers. (2mks)
5. Explain what happens when a marine amoeba is transferred to distilled water. (3mks)
6. Name the cell structure responsible for:
 - (i) Turgor pressure (1mk)
 - (ii) Wall pressure (1mk)
7. (a) State one similarity and one difference between epithelial and epidermal tissues.

Similarity	(1mk)
Difference	(1mk)
- (b) State two importance of cell membrane having electric charges. (2mks)
8. Explain the significance of diffusion to plant pollination. (1mk)
9. Explain the process of starch digestion in the duodenum. (3mks)
10. Glucose and oxygen gas are produced as a result of photosynthesis.
 - (i) Where do the oxygen atoms in glucose come from? (1mk)
 - (ii) Where do the atoms in the oxygen gas come from? (1mk)
11. At temperatures above 40°C the rate of transpiration falls. Explain. (1mk)
12. Give the significance of the endothelium in arteries. (1mk)

13. The homeostatic control of blood glucose concentration carried out by the human liver is shown on the diagram.

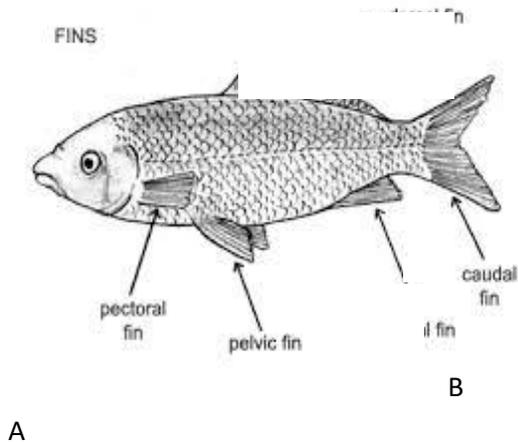


- (a) Name the storage carbohydrate found in the liver. (1mk)
- (b) (i) Name the hormone X and Y (2mks)
- Hormone X.....
- Hormone Y.....
- (c) Name the organ that produces hormones X and Y (1mk)
14. Differentiate between lenticels and spiracles. (1mk)
15. Explain the events that follow oxygen debt. (3mks)
16. The diagram below illustrates part of the human respiratory system.

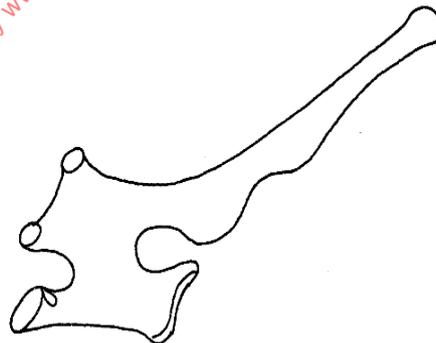


- (a) Name the organism that may cause infection to the parts marked X. (1mk)
- (b) State one way in which part Y is suited to its function. (1mk)
17. State the functional difference between prostate glands and cowpers' gland. (2mks)
18. State two methods by which fossils were formed. (2 marks)

19. The diagram below shows the external structure of Tilapia.

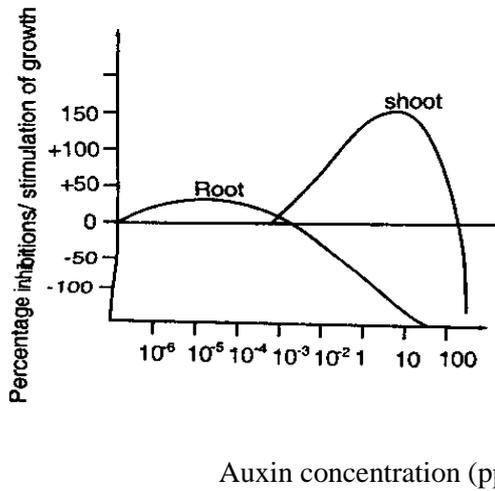


- (a) Apart from swimming, state other functions of the fins labelled A & B (2mks)
- (b) State two functions of swim bladder in a fish. (2mks)
20. (i) State two importance of DNA molecule. (2mks)
- (ii) What is DNA replication? (1mk)
- (iii) A DNA strand sequence had the following base sequence TAC GCT. What is the sequence of M-RNA strand copied from this DNA portion? (1mk)
21. Differentiate between aerotaxis and rheotaxis (2 marks)
22. Which structure in the ear detects
- (a) Sound waves. (1mk)
- (b) Change in posture. (1mk)
23. (a) What do similarity of wings of bats and those of insects illustrate? (1mrk)
- (b) Name three evidences that show that organic evolution has taken place. (3 mrks)
24. Explain what is meant by a test-cross as used in genetics. (1mrk)
- (a) Determine the probability of a couple with blood group AB getting a child with blood group B. (Show your working). (3mks)
25. The diagram below represents a mammalian vertebra.



- (a) Identify the vertebra represented above. (1mk)
- (b) Give a reason for your answer. (1mk)

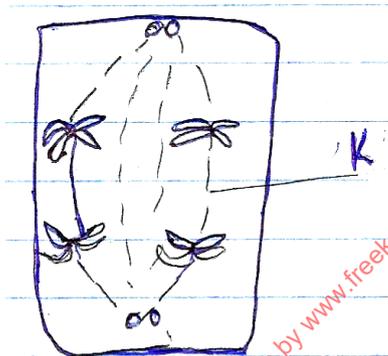
26. Below is a graphical representation of the effects of different concentration of auxins on shoot and root growth. Study it carefully and then answer the questions that follow.



- (a) Identify **any two** conclusions that can be drawn from the graph.
 (b) Name the growth hormone responsible for ripening of fruits.

(2mks)
 (1mk)

27. The diagram below represents a stage during cell division.

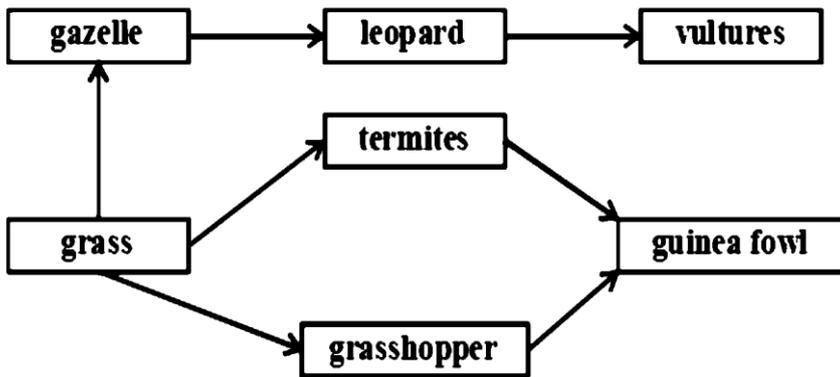


- i) Identify the stage of cell division.
 ii) Give two reasons for your answer (a) above.
 iii) Name the structures labeled K.
28. Name the causative agent for the following diseases;
 a) Typhoid
 b) Syphilis
29. (a).Name **three** supportive tissues in plants.
 (b) Name the type of muscles found in the gut.

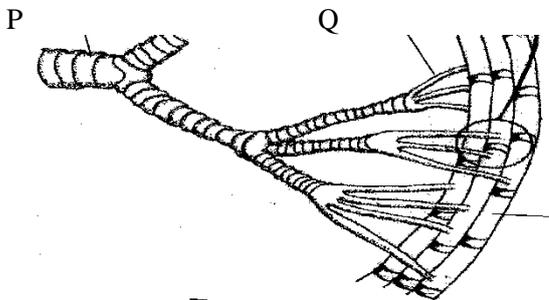
(1 mrk)
 (2 mrks)
 (1 mrk)
 (1 mrk)
 (1 mrk)
 (3mks)
 (1mk)

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2. The figure below represents a food web in a closed ecosystem.

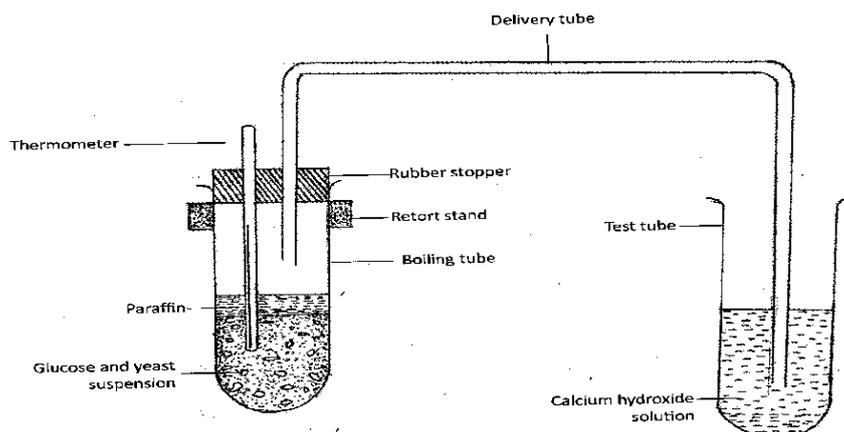


- i) Distinguish between a food chain and a food web. (2marks)
 - ii) Write a food chain in which the vultures are the secondary consumers. (1mark)
 - iii) What would be the effect of introduction of locusts into the ecosystem? (2marks)
 - iv) What would be the effect of removal of grass from the habitat? (1mark)
 - v) State the trophic level occupied by the leopards in the above food web. (1mark)
 - vi) State one importance of decomposers in an ecosystem. (1marks)
3. In an experiment, a black mouse was mated with a brown mouse. All the offsprings in the F_1 generation were black. The off springs grew and were allowed to mate with one another. The total number of F_2 generation offspring were 96.
- (a) Using letter **B** to denote the gene for black colour. Work out the genotype of the F_1 generation. (Use a punnet square) (4marks)
 - (b) Give the following for the F_2 generation
 - (i) Genotypic ratio (1 mark)
 - (ii) Phenotypic ratio (1 mark)
 - (iii) The total number of brown mice (1 mark)
 - (c) What is a test cross? (1 marks)
4. The diagram below represents part of a gaseous system in a grasshopper.



- (a) Name the structures labeled P and Q (2marks)
- (b) State the function of the structure labeled P (1mark)
- (c) Describe the path taken by carbon (IV) oxide from the tissues of the insect to the atmosphere. (3 marks)
- (d) How is the structure labeled Q adapted to its functions (2marks)

5. The set up below illustrates an experiment to demonstrate a certain biological process, before the addition of the yeast suspension the glucose solution was first boiled and then cooled at 40°C.



- (a) What was the aim of the experiment? (1mark)
 (b) What observations would you make in the tubes a few minutes after the experiment begun? (2marks)
 (c) Explain the observations made in (b) above (1mark)
 (d) Why was glucose solution boiled before cooling at 40°C (1 mark)
 (e) Why was paraffin used in the set up? (1mark)
 (f) How can you set up a control experiment for the above? (1mark)

SECTION B

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

6. The percentage germination of certain seeds at different temperatures was determined as follows.

Temperature (°C)	0	10	20	30	40	50
% germination	0	30	40	90	2	0

- (a) Using a suitable scale, plot a graph of % germination against temperature. (6 marks)
 (b) Account for percentage germination at
 (i) 0°C (1mark)
 (ii) 30°C (2 marks)
 (iii) 50°C (1 mark)
 (c) What is seed viability? (2 marks)
 (d) State the factors that determine seed viability. (4 marks)
 (e) How can seed dormancy be broken? (4 marks)
7. (a) State the functions of the mammalian skin. (4mks)
 (b) Describe how the human skin is adapted to its functions (16mks)
8. Explain the evidences of organic evolution. (20mks)

**KANDARA
BIOLOGY PRACTICAL CONFIDENTIAL
END OF TERM 2 FORM 4 2019**

Each student should be provided with the following

- Specimen Q–Irish potato tubers
- Solution S- Strong salt solution
- Solution R- Distilled water
- Pestle and mortar
- 4 test tubes
- Source of heat
- Test tube holder
- Scalpel
- Iodine solution
- Benedict’s solution
- Sodium hydroxide
- Copper sulphate solution.
- Means of timing

KANDARA MOCKS

231/3

Biology

Practical

Paper 3

1. You are provided with specimen labelled **Q**. cut the specimen into two halves.
 - (a) Cut four rectangular strips from one half of specimen **Q**, each strip should be of 20mm long and 5mm wide. Place two strips into solution **R** and the other two strips into solution **S**. Allow the experiment set ups to stand for 10 minutes.
 - (i) Using your fingers feel the texture of the stripes and record your observations from each solution:

Solution R	(1mark)
Solution S	(1mark)
(ii) Account for your observations of no. (i) above.	(4 marks)
 - b) Peel the other half of specimen **Q**, cut into small pieces and then crush in a mortar. Use the Reagents provided to test for the various food substances in the extract obtained from the crushed material.

Record **the procedures, observations and conclusions** in the table below.

(9marks)

Food substance	Procedure	Observations	Conclusion
----------------	-----------	--------------	------------

2. The Diagram below shows two organisms (R and S) belonging to the same phylum

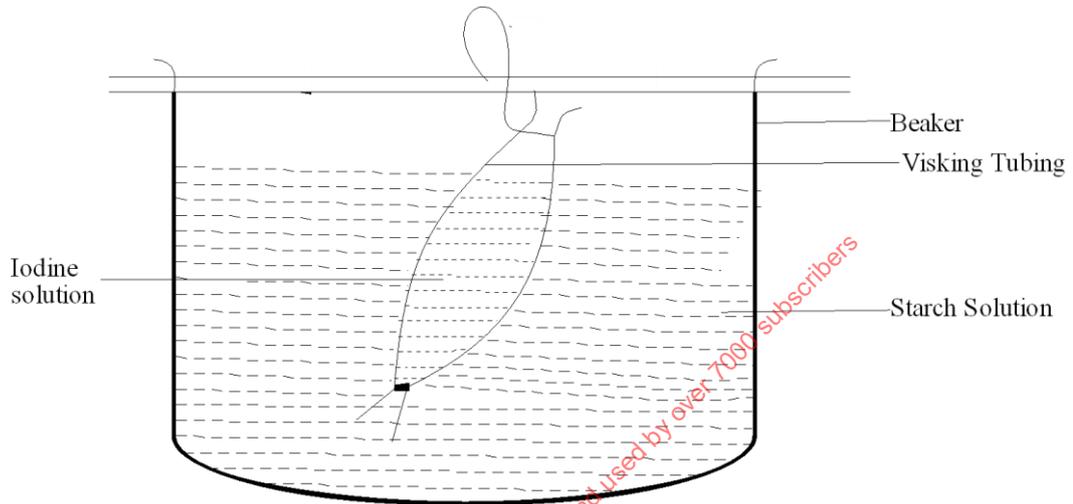


R

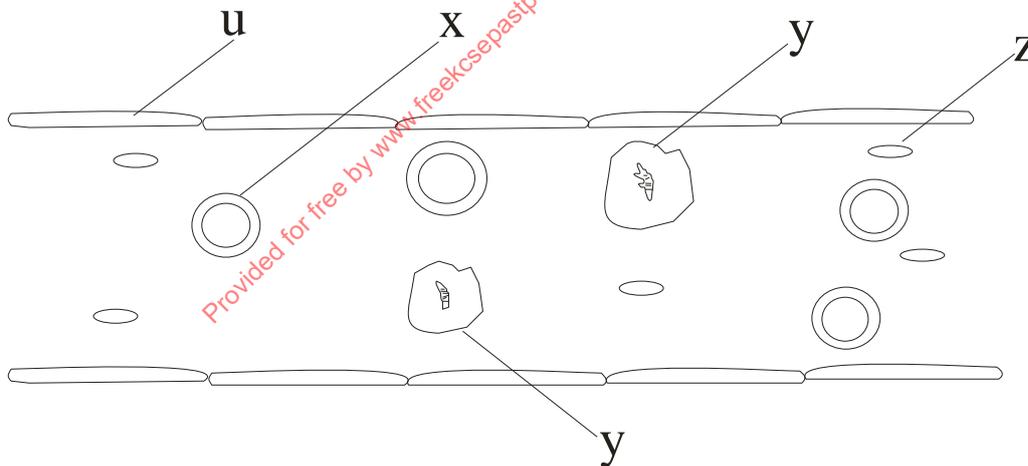
S

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- (a) State what was being investigated in the set up above (2 marks)
 - (b) Using diagrams illustrate how the seedlings **A** and **B** appear after 48 hours? (2 marks)
 - (c) Explain the results in b) above
 - Seedling **A** (1 mark)
 - Seedling **B** (2 marks)
 - (d) Explain why seedling **C** was included in the set up (1 Mark)
3. Below is a set up showing a certain physiological process

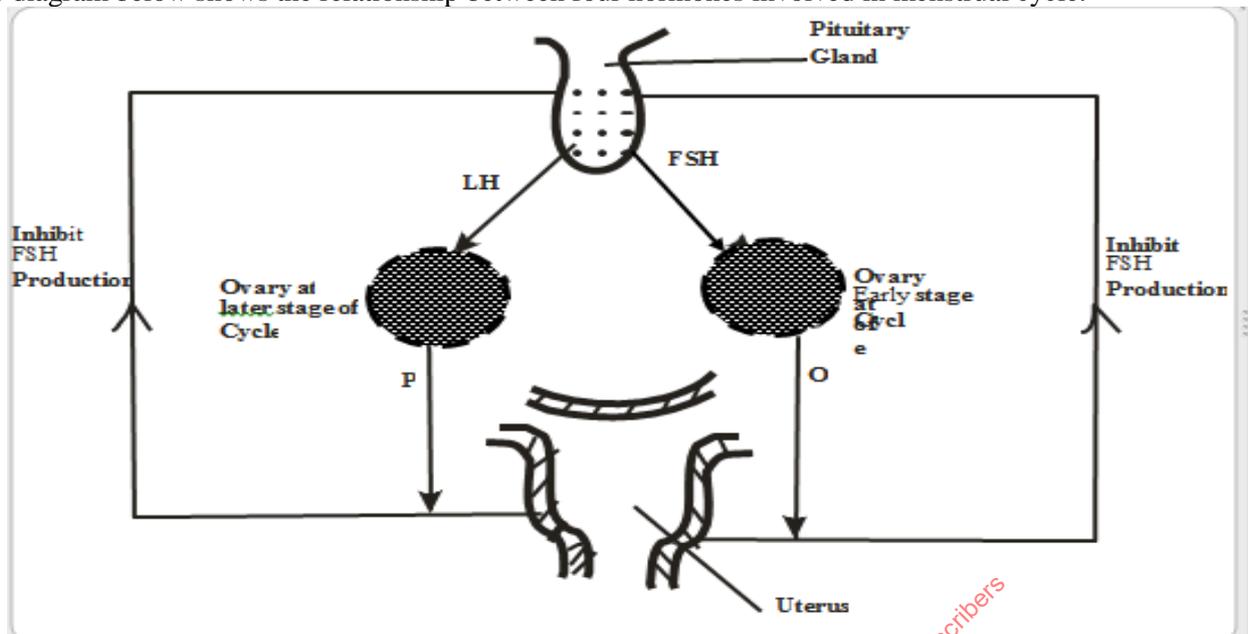


- (a) Identify the process (1 mark)
 - (b) Explain the observation made after 10 minutes (4 marks)
 - (c) Outline **3 roles** of active transport in the human body (3 marks)
4. The following is an illustration showing a blood vessel. Study it then answer the questions below.



- (a) Identify the blood vessel..... (1 mark)
- (b) How is the blood vessel named in (a) above adapted to its functions. (2 marks)
- (c) Name the cells labeled **X** and **Y** and part **U**. (3 marks)
- (d) State the function of the cell labeled **Z** (1 Mark)
- (e) Name the fluid in which cells X, Y and Z are suspended (1mark)

5. The diagram below shows the relationship between four hormones involved in menstrual cycle.



Key:

- FSH – follicle stimulating hormone
- LH – Luteinising hormone
- O – Oestrogen
- P – Progesterone

- (a) Both Oestrogen and progesterone affect the uterus during the menstrual cycle. State the effects each has on the uterus (2 marks)
 - (i) Oestrogen
 - (ii) Progesterone
- (b) What effects does FSH have on the early stage of the menstrual cycle (2 marks)
- (c) Where in the ovary is progesterone formed?..... (1 mark)
- (d) One type of contraceptive pill contains both oestrogen and progesterone. Explain briefly how such pills prevent conception. (1 mark)
- (e) Where else is the hormone progesterone produced and at what time? (2 marks)

SECTION B (40 MARKS)

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

6. The length of a grasshopper femur and internode of a seedling were recorded in a period of 24 weeks. The results are recorded in the table below.

Week	1	3	5	7	10	13	16	18	20	24
Average length of femur	8.0	9.0	9.0	9.0	13.0	13.0	15.0	19.0	19.0	19.0
Average length of internode(mm)	5.0	6.5	10.5	16.5	24.5	27.5	32.5	34.5	36.0	37.5

- (a) Plot a graph of length of femur and length internode against time on the same axis. (7mks)
- (b) (i) What was the average length of internode in the 8th week? (1mk)
 - (ii) Suggest how average length of internodes was obtained. (2mks)
- (c) Name the type of growth curve shown by
 - (i) Grasshopper (1mk)
 - (ii) Seedling (1mk)
- (d) Account for the change in length for femur between
 - (i) 3rd and 7th week (2mks)
 - (ii) 16th and 20th week (2mks)
- (e) (i) State what causes increase in length of internodes in the seedling.
 - (ii) Which animal phylum exhibits the growth pattern of the femur.

(iii) Name the hormone responsible for the growth pattern in grasshopper.

(iv) Work out the rate of growth of the seedling between week 7 to 10 (2mks)

7. Describe the structure and function of various parts of the skin (20mks)

8. (a). During a voting exercise tension was high as one of the aspirants was furious and wanted to face a very aggressive opponent. Explain the physiological changes that occur in his body to prepare him for the fight. (14mks)

(b) Identify each of the following responses described below.

i) A person coughs whenever a foreign body irritates the respiratory tract (1mk)

ii) Whenever a bell is rung, a dog is presented with a meal. After several days of practice, the dog salivates once the bell is rung even if food is not available (1mk)

iii) State the difference between the two responses identified in (b) above (4mks)

THE SALVATION ARMY KENYA WESTTERRITORIAL EVALUATION TESTS (SAKWETET)

231/3

BIOLOGY

PAPER 3

(PRACTICAL)

1. You are provided with visking tubing labeled V, a piece of thread and a solution labeled M. Dip the visking tubing in distilled water to moisten it, open it, and then tie one end tightly with the thread provided. Half-fill the visking tubing with solution M, then tie the open end of the tubing tightly. Ensure solution K does not spill out of the tubing. Immerse the visking tubing into distilled water in a beaker. Ensure that the visking tubing is completely immersed in the distilled water.

Leave the set-up for 20 minutes. Record your observations after 20 minutes.

(a) (i) Observation (1mk)

(ii) Explain your observations in (i) above (2mks)

(b) Remove the visking tubing carefully. Ensure the contents of the visking tubing do not mix with that of the beaker. Using the reagents provided, test for the food substance present in the visking tubing and the beaker. (8 Marks)

I Solution in the Visking tubing

Food test	Procedure	Observations	Deductions
Starch			
Reducing sugars			

I Solution in the Beaker

Food test	Procedure	Observations	Deductions
Starch			
Reducing sugars			

(c) Explain the observations and deductions in (b) above. (2 marks)

d) State **one** application of the physiological process demonstrated above. (1 Marks)

Q 2. The diagrams below show different types of fruits. Use them to answer the question that follow.



R 1



MAPLE

R 2



R 3



R 4



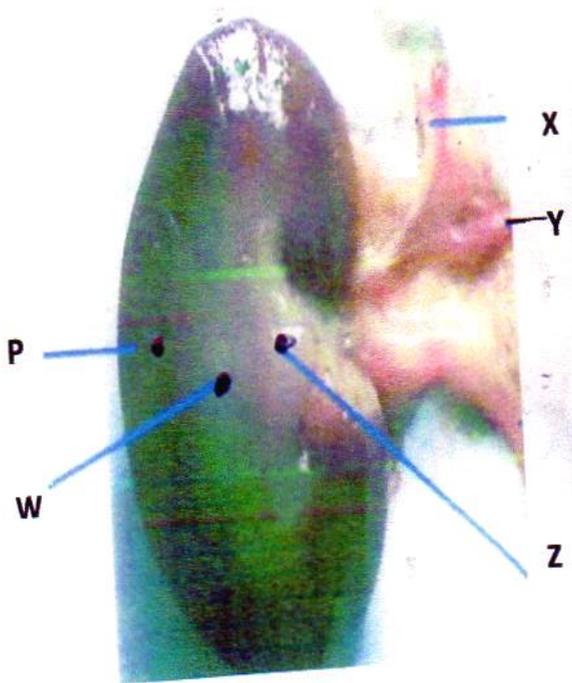
R 5



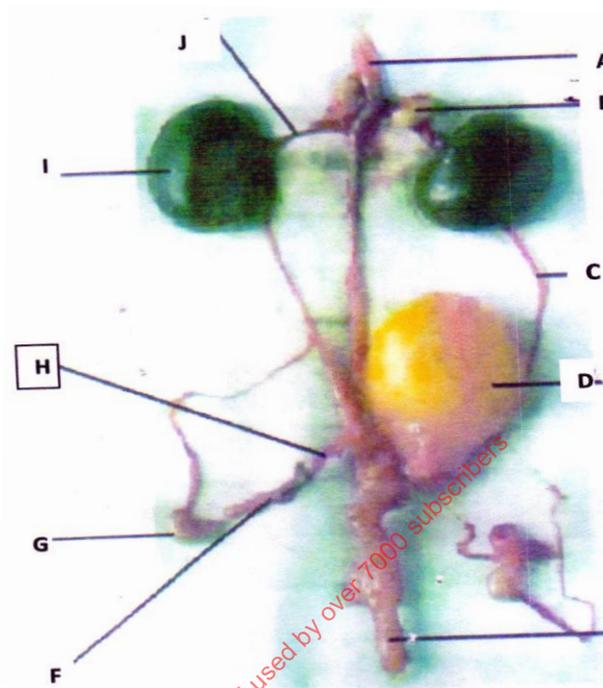
R 6

- (a) i) Name the type of placentation shown in photograph R5 and R6 (2 Marks)
 (ii) Draw a well labeled diagram of one on the fruits in photograph R1 in the diagram above (3 Marks)
- (b) State the mode of dispersal and give reasons for the fruits shown in photograph R1, R2 and R3 (6 Marks)
- (c) Explain **two** adaptations of fruit shown in photograph R 4. (2 Marks)

Q 3. The photographs **A** and **B** below represent part of urino-genital system in rabbits.



Photograph A



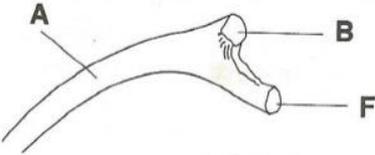
Photograph B

Study them to answer the questions that follow

- a) Using photograph **B**;
- (i) Name the parts labeled **F**..... **C**..... (3mks)
I.....
- (ii) Name and state the functions of the parts labeled **B** and **G** (4 marks)
- (iii) Name the fluid found in part labeled **D**..... (1 mark)
- (b) Study photograph **A** carefully.
- (i) Name part **Z**..... (1 mark)
- (ii) Differentiate between the contents in the structure **X (Renal artery)** and **Y (Renal vein)** (2 marks)
- (c) Which parts of the nephron are found in the region labeled **W** (2marks)

TRIAL 11
231/1
Biology
Paper 1

- (a) What is carbonic anhydrase? (2 marks)
 (b) State the role of haemoglobin in the transport of carbon (IV) oxide. (2 marks)
- What is the role of light to a lion in the ecosystem? (4 marks)
- (a) State the contents of lysosomes. (1 mark)
 (b) State the functions of the contents named in (a) above. (2 marks)
- (a) The diagram below represents part of a rib.

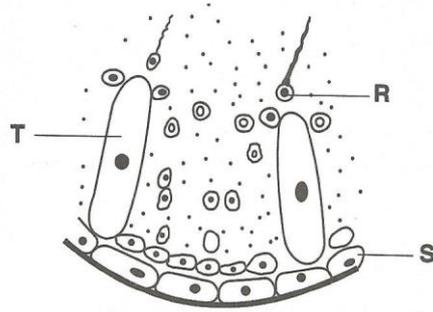


- Name the parts labelled **A**, **B** and **F**. (3 marks)
 (b) State the function of the broad facets on the anterior part of the atlas. (1 mark)
- Describe the role played by water in the support of herbaceous plants. (3 marks)
 - State the role played by the following structures during inhalation:
 - Diaphragm, (2 marks)
 - Intercostal muscles. (3 marks)
 - (a) Name **two** genetic disorders of blood. (2 marks)
 (b) Define the term backcross. (1 mark)
 - The diagram below shows a newly germinated seedling with ink marks 2 mm apart. Study it and answer the questions that follow.

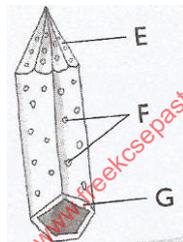


- (i) Which region would you expect to be longest after 5 days further growth? (1 mark)
 (ii) Give a reason for your answer in (a)(i) above. (1 mark)
 - In which regions would you expect root hairs to appear? (1 mark)
 - Name the structure that protects the region labelled **I**. (1 mark)
- (a) How is high pressure build up in the glomerulus? (1 mark)
 (b) Why is this pressure necessary? (1 mark)
 - (a) Describe the concentration and volume of urine produced by a person who has been playing soccer on a hot day. (2 marks)
 (b) Explain your answer in (a) above. (3 marks)
 - (a) (i) Name the process that results in the formation of pyruvic acid in a cell. (1 mark)
 (ii) Name the part of a cell where the process named in (a) above occurs. (1 mark)
 (b) Name the process that utilizes the pyruvic acid from the process named in (a) above. (1 mark)
 - Name the organelle that performs the following functions in a cell.
 - Transports cell secretions, (1 mark)
 - Controls materials entering and leaving the nucleus. (1 mark)

- (c) Forms cilia and flagella. (1 mark)
13. (a) Name the structure responsible for intermittent growth in an insect, giving a reason. (2 marks)
- (b) Name a hormone produced by the corpus allatum in insects. (1 mark)
14. The diagram below shows part of a seminiferous tubule.



- (a) Name the parts labelled **R**, **S** and **T**. (3 marks)
- (b) Name the tube into which the seminiferous tubules open. (1 mark)
15. State **two** main events that occur at interphase I. (2 marks)
16. Describe how oxygen from the environment reaches a respiring cell of a terrestrial leaf. (3 marks)
17. Give **two** reasons why gametes are haploid. (2 marks)
18. A plastic bottle full of water was stoppered with a piece of stem from a young herbaceous plant, whose epidermis had been peeled off. After 24 hours, it was noted that the stopper closed the bottle tightly. Explain the observation made. (3 marks)
19. (a) Name the products of the light dependent stage of photosynthesis. (1 mark)
- (b) Explain why some plants such as *Drosera* species trap and digest insects. (3 marks)
20. The diagram below represents a certain plant structure.



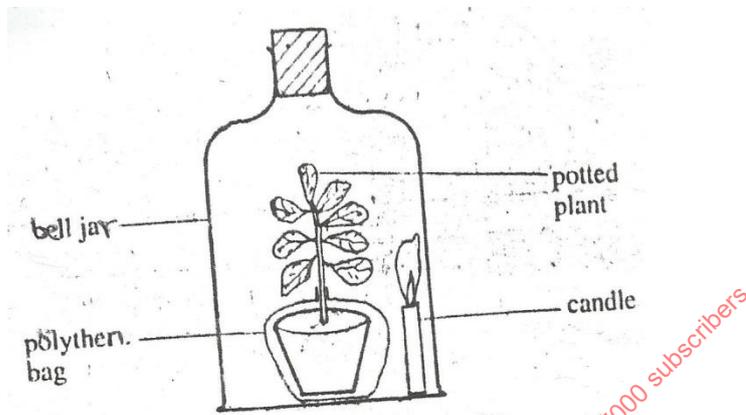
- (a) Identify the structure. (1 mark)
- (b) Name the parts labelled **E**, **F** and **G**. (3 marks)
- (c) State **two** functions of the structure. (2 marks)
21. (a) What are fossils? (1 mark)
- (b) State **two** limitations of the use of fossils as evidence for evolution. (2 marks)
- (c) What is meant by the following terms?
- (i) Struggle for existence, (1 mark)
- (ii) Survival of the fittest. (1 mark)

TRIAL 11
KCSE PRE- TRIAL
231/2
BIOLOGY

SECTION A (40 marks)

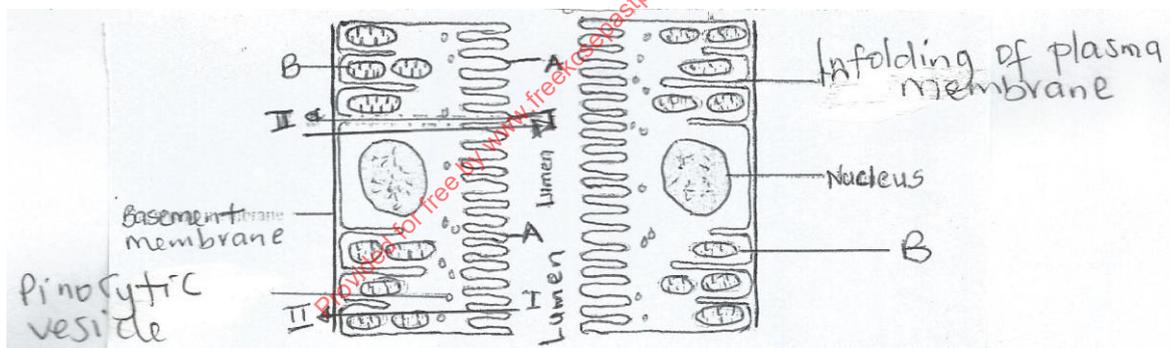
Answer **ALL** the question in this section in the spaces provided.

1. A student investigating an aspect of photosynthesis set up an experiment as shown in the diagram below.



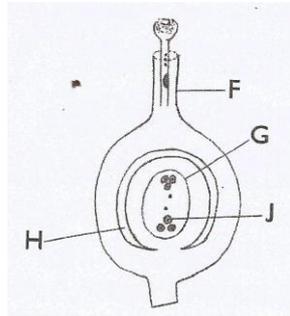
The bell jar was made airtight. After some time the candle went off. The student placed the set up in direct sunlight for 5 hours.

- (a) Give a reason a burning candle was included in the set up. (1 mark)
 - (b) (i) What would be the difference in the composition of gases in the bell jar at the time the set up was placed in the light and after 5 hours. (2 marks)
 - (ii) Give reasons for your answer in (b)(i) above. (2 marks)
 - (c) Suggest **two** reasons why it was necessary to cover the pot with a polythene bag. (2 marks)
2. The diagram below shows a transverse section through the proximal convoluted tubule of a mammalian nephron.



- (a) Name the structures labelled **A** and **B**. (2 marks)
 - (b) State **three** ways in which the tubule is adapted to its function. (3 marks)
 - (c) Name:
 - (i) **Two** substances that move from region I to region II during selective reabsorption. (2 marks)
 - (ii) The physiological process in the activity in (c)(i) above. (1 mark)
3. (a) Inheritance of human blood groups deviates from normal monohybrid inheritance in two ways. State the **two** deviations observed. (2 marks)
- (b) What is sex linkage? (1 mark)
- (c) In *Drosophila melanogaster* the inheritance of eye colour is sex linked. The gene for red is dominant. A cross was made between a homozygous red eyed female and a white eyed male. Work out the phenotypic ratio of the F₁ generation. Use **R** to represent the dominant gene. (5 marks)
4. Two boys Brian and John collided during a rugby match and each got bruised. Brian's bruise stopped bleeding after 10 minutes while John's bruise continued bleeding and he had to be treated at a nearby hospital.

- (a) Explain how Brian’s bleeding stopped. (5 marks)
 - (b) Why didn’t John’s bleeding stop? (1 mark)
 - (c) Explain why people with blood group AB are universal recipients. (2 marks)
5. The diagram below represents a certain plant structure.



- (a) Name the part labelled **F**. (1 mark)
- (b) Describe what happens when the pollen tube enters the structure labelled **G**. (5 marks)
- (c) What do the structures labelled **J** and **H** develop into after fertilization? (2 marks)

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 three healthy rabbits were fed on equal amounts of carbohydrates. After one hour the glucose concentration in the blood was measured at 30 minutes intervals for three hours. The results were as shown in the table below.

Glucose Concentration	Initial	30 min	60 min	90 min	120 min	150 min	180 min
Rabbit							
P	1.60	1.55	1.43	1.36	1.30	1.19	1.11
Q	1.49	1.39	1.39	1.32	1.27	1.20	1.09
R	1.57	1.39	1.33	1.27	1.18	1.10	0.99
MEAN	1.55	1.44	1.32	1.25	1.16

- (a) (i) Calculate the mean concentration of glucose in mg per ml of blood 60 and 180 minutes. Record your answer in the table. (2 marks)
 - ii. On the grid provided plot a graph of the mean glucose concentration against time. (6 marks)
 - (b) What was the mean glucose concentration in the blood after 75 min? (1 mark)
 - (c) Why was it necessary to use three rabbits in the experiment? (1 mark)
 - (d) Suggest a reason why the initial concentration of glucose in the three rabbits was not the same. (2 marks)
 - (e) Account for the difference in mean glucose concentration during the period. (3marks)
 - (f) Name **two** end products of digestion. (2 marks)
 - (g) What is the fate of excess glucose in plant? (3 marks)
7. (a) Explain how the following abiotic factors influence distribution of organism in an ecosystem. (8mks)
- i) Light intensity
 - ii) Temperature
 - iii) Wind
 - iv) Water availability
- (b) Describe the flow of energy from the sun through the different trophic levels in an ecosystem. (12 marks)
8. Discuss the evidence of organic evolution. (20mks)

TRIAL 11
CONFIDENTIAL
L 231/3
(practical)

Requirements **P**-Kale/sukuma week leaf with long petiole

Graph paper, attached to the question paper
 3 petri dishes
 Scalpel
 Solution **K₁**-Distilled/tap water
 Solution **K₂**- conc.salt solution
 2 labels

2. Specimen **C**- humerus
 Specimen **D**- cervical vertebra
 Specimen **E** – thoracic vertebra
 3. Liquid **L₁** – conc. Sodium hydrogen carbonate sln ($\text{NaHCO}_3(\text{aq})$)
 Liquid **L₂** – Starch solution
 4 test tubes
 4 labels
 Test tube rack
 Measuring cylinder/ syringe
 Olive oil/liquid cooking oil (10 drops each)
- Small Irish potato
 Pestle and mortar or white tile and glass rod
 Iodine solution

TRIAL 11
213/3
BIOLOGY
Paper 3
(Practical)

1. You are provided with a specimen labelled **P** and a graph paper.
 - (a) (i) Use the graph paper provided to determine the surface area of specimen **P**.
 Surface area. (1 mark)
 - (ii) Describe how you arrived at your answer. (3 marks)
 - (b) What is the significance of the surface area of **P**? (2 marks)
 - (c) How is specimen **P** adapted to perform its functions? (2 marks)

Using a scalpel obtain about 3cm piece of petiole from specimen **P**. Split the piece lengthwise into two halves then split each of the halves into quarters. Put liquid **K₁** in petri dish labeled **K₁** and liquid **K₂** in petri dish labeled **K₂**. Place one of the splits into liquid **K₁** and another in liquid **K₂**. Allow the set up to stand for 30 minutes. Examine the pieces after 30 minutes.

- a) Draw and label the appearance of the splits placed in liquid **K₁** and **K₂** (3 marks)

Liquid **K₁**
 Liquid **K₂**
- b) Account for the observations in liquid **K₁** and **K₂** in a) above (3 marks)
2. You are provided with specimens labelled **C**, **D** and **E** which are obtained from the same animal.
 - a) Identify specimen **C** and **D**, giving reasons.

Specimen **C**, (1 mark)
 Reasons. (2 marks)
 Specimen **D**, (1 mark)
 Reasons. (2 marks)
 - (b) (i) Name the bone that articulates with specimen **C** on the anterior end. (1 mark)
 - (ii) How is the bone named in (b)(i) above adapted to articulate with specimen **C**? (1 mark)

- (c) (i) Identify Specimen **E**. (1 mark)
 (ii) From which part of the body is specimen **E** obtained. (1 mark)
 (d) Draw and label the anterior view of specimen **E**. (4 marks)

3. You are provided with olive oil, liquids labeled **L₁** and **L₂** and an Irish potato.

Label two test tubes **A** and **B**

Place 2cm³ of water in each test tube.

Add 8 drops of olive oil into each test tube.

To test tube labelled **A** add 8 drops of liquid **L₁**

Shake both test tubes. Allow to stand for 2 minutes.

- (a) i) Record your observations . (2 marks)
 Test tube **A**.
 Test tube **B**.
 (ii) Name the process that has taken place in test tube **A**. (1 mark)
 (iii) State the significance of the process named in (a)(ii) above. (1 mark)
 (iv) Name the:
 Digestive juice in humans that has the same effect on oil as liquid **L₁**. (1 mark)
 Region of alimentary canal into which the juice is secreted. (1 mark)
- (b) Label two test tubes **C** and **D**.
 Place 2cm³ of liquid **L₂** into each test tube. Add a drop of iodine solution into each test tube.
 i) Record your observation. (1 mark)
 ii) What is the identity of **L₂**? (1 mark)

Cut a cube whose sides are 1cm from the Irish potato provided. Crush the cube to obtain a paste. Place the paste in the test tube labeled **C**. Leave the set up for at least 30 minutes.

- iii) Record your observation. (2 marks)
 iv) Account for the results in (b)(iii) above. (4 marks)

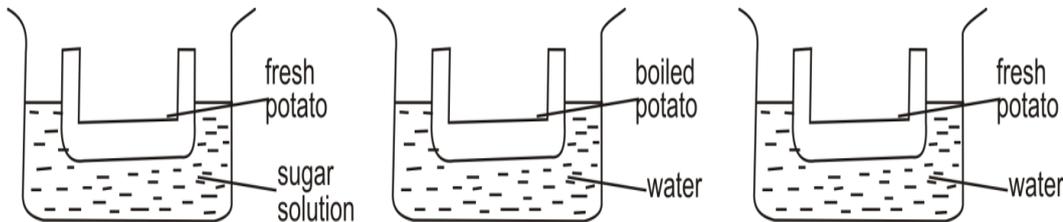
SG CLUSTER

231/ 1

BIOLOGY- PAPER 1(THEORY)

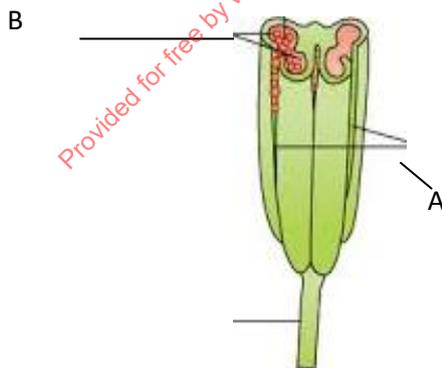
1. Explain the importance of the following life processes
 - (a) Respiration (1mark)
 - (b) Reproduction (1mark)
2. a) Define binomial nomenclature (1 mark)
- (b) State **four** reasons why classification is important in biology (4 marks)

3. (In an experiment a biology teacher set up the materials indicated below:



If the experimental set up was left overnight, explain the appearance of the potato tissue in:

- A (1mark)
 - B (1mark)
 - C (1mark)
4. Name structures used for gaseous exchange in higher plants (2marks)
 5. State four adaptations of the Red blood cell to its function. (4 marks)
 6. (a) State the importance of pleural fluid in the lung of a mammal. (2marks)
 - (b) State two function that cilia of the trachea play during gaseous exchange in a mammal? (2 mark)
 - (c) What significance does mucus offer a mammal during gaseous exchange? (1 mark)
 7. State the role of each of the following components of the skin. (2 marks)
 - Sebum
 - Melanin
 8. State three biotic factors in an ecosystem. (3 marks)
 9. The diagram below represents a male reproductive transverse section structure in plant



- i) Name structures A and B (2marks)
 - ii) Name the type of cell division taking place in structure A (1 mark)
 - iii) State Two significance of the named type of cell division in (ii) above in Sexual Reproduction. (2marks)
10. Give the full Name of the abbreviation. DNA (1 mark)
11. An animal has the following dental formula:
- $$I = \frac{0}{2} \quad C = \frac{0}{0} \quad PM = \frac{3}{3} \quad M = \frac{2}{3}$$
- i) Suggest the type of diet for this animal. (1mark)
 - ii) Give a reason for your answer in (a) above. (1mark)
 - iii) How many teeth does the animal have in total?

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SG-CLUSTER
BIOLOGY 231/3
PAPER 3

CONFIDENTIAL INSTRUCTION TO SCHOOLS

The information contained in this paper is to enable the head of the school and the teacher in charge of Biology to make adequate preparations for this year's Biology Practical examination.

NO ONE ELSE should have access to this paper or acquire knowledge of its contents. Great care **MUST** be taken to ensure that the information herein does not reach the candidates either directly or indirectly. The teacher in charge of Biology **SHOULD NOT** perform any of the experiments or give any information related to these instructions to the candidates.

Each candidate will require the following:

1. 10% glucose solution
2. Substance labeled **Y**- yeast
3. Solution labeled **X** – calcium hydroxide
4. Measuring cylinder
5. Boiling tube
6. Thermometer
7. Delivery tube at least bended
8. Water bath
9. Stop watch
10. Methylene blue
11. Stop watch
12. Methylene blue
13. Glass slide and cover slip
14. A dropper
15. Microscope with the following parts labeled **Q**-lower objective lens and **P** revolving nose piece
16. Rubber bung/ stopper.
17. Test tube

SG- CLUSTER
231/ 1 BIOLOGY- Paper 1 (Theory)
MARKING SCHEME

1. a) Energy formation
 b) Procreation / prevents extinction of a species
 Brings about variation of species (Mark first 1)
2. a) Binomial Nomenclature is a two-term naming system which uses two different terms to name the species, plants, animals and living organisms
 (b) State **four** reasons why classification is important in biology (4 marks)
 - It makes the study of living organisms easier.
 - It helps in the specific identification of any given organism.
 - The study of a few representatives from each distinct group helps us to know about the characteristic features of organisms of that group.
 - It indicates the evolutionary relationship between different groups of organisms.
3. Potato tissue decreases in size/becomes flaccid due to loss of water by osmosis to the sugar solution.
 Potato tissue will not change in size because the membranes of the cells are denatured
 Potato tissue increases in size/becomes stiff/turgid because it draws water by osmosis

4. Stomata
Lenticels
5. **State three adaptations of the Red blood cell to its function.**
- Bi-concave in shape
 - Flexible walls
 - Has haemoglobin
 - Non- nucleated
6. (a) State the importance of pleural fluid in the lung of a mammal. (2marks)
- Lubricates the Lungs and reduces friction during breathing
 - Moistens the alveolus to dissolve diffusion gases
- (b) Waft away/ Removes mucus and foreign particles from the Lungs
- (c) Traps any foreign particles that try to enter the lungs
7. **State the role of each of the following components of the skin.** (2 marks)
- ✓ Melanin - protects the skin against ultraviolet rays
 - ✓ Sebum
 - Kills bacteria by its antiseptic properties
 - Keeps the hair and skin soft and supple
8. **State three Biotic factors in an ecosystem.** (3 marks)
- Parasitism
 - Predation
 - Symbiosis
 - Saprophytism
9. (i) **Name structures**
- i. A -pollen sacs
 - ii. B- Pollen grain
- (ii) **Name the type of cell division taking place in structure A** (1 mrk)
Meiosis
- (iii) **State Two significance of the named type of cell division in (ii) above in Sexual Reproduction.** (2mrks)
- i. Formation of gametes/ sex cells
 - ii. Brings about genetic variation amongst the offspring's
10. DNA- Deoxyribon Nucleic Acid;
11. I) Suggest the type of diet for this animal. (1mark)
- a) Vegetation / green plants Ref. herbivore / herbivores; (1mk)
 - b) Absence of upper incisors and upper and lower canines; (2mks)
 - c) 30 teeth; (1mk)
12. a)
- (i) A- Root hair;
B- Phloem;
 - (ii) Translocation of manufactured food / soluble products of photosynthesis; (1mk)
13. (a) Converts glycogen fats, proteins and amino acids to glucose;
- (b) Pancreas; (1mk)
14. Differentiate between the following terms. (2marks)
- a) Population: Refers to members of one species occupying a particular habitat at a given time. It constitutes two or more populations i.e. (many species) occupying and interacting in the same habitat;
(The two must be correct to award a mark)
- (b) Predator is an organism which kills another for food while parasite is an organism which live on or in another living organism (host) and benefit from the host but the host does not benefit;
15. (a) Embryo sac; ✓1
b) S – Antipodal cells; ✓½

T – Polar nuclei; rej. Polar nucleus. ✓½

U - Egg cell; ✓½

W – Micropyle; ✓½

16. Salmonellatyphiplasmodium SPP

17. (a) Presence of fins; body covered with scale; streamlined body; lateral line; (2mks)

(b) P – Sensitivity / detect vibration and changes in water pressure;

18. Bone formation; strong teeth; muscle contraction; blood clotting. Rej. blood clotting.

19. (a)

Etiolated	Normal
- Weak elongated stem	- Short strong stem
- Yellow leaves	- Green leaves
- Longer internodes	- Short internode

(b) Enables plants grow tall to attain maximum light for photosynthesis;

20. a) i) A-duodenum
C-rectum

ii) Stores faeces temporary

b) Its lignified to offer support in plants

21. had an effect of more ultrafiltration since there was more blood pressure created in the glomerulis hence increased the amount of urine produced

22. a) Its a steady state of the body to adjust to changes in the body of an organism to optimum levels

b) Breathing, gaseous exchange, osmoregulation, Phregulation, excretion and any other

23. a) Smooth endoplasmic reticulum b) Lysosomes

c) Nucleus d) Centrioles

24. It reduces rate of transpiration as the moist air cretes a lower diffusion gradient thus more water preservation

25. Responsible for turgor in plants

Removal of excess water in aquatic plants

Cools the plants

Replaces water loss through the leaves

26. (a) The first student who saw 10 bacteria was using a higher total magnification while the second student who saw 50 bacteria was using a lower total magnification.

(b) The eye piece x 10 objective lens x 40

= x 400

27. Name the phase of growth labelled. B nad D

(a) Exponential phase / phase of accelerated growth ;

(ii) Stationary phase/plateau phase;

(b) Number of cell dividing are few / cells not yet adjusted to the surrounding environmental factors

UASIN GISHU ACK JOINT EXAM

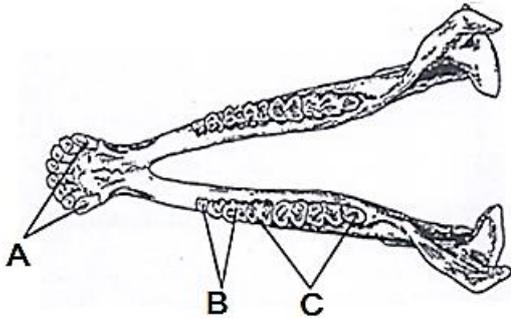
231/1

BIOLOGY

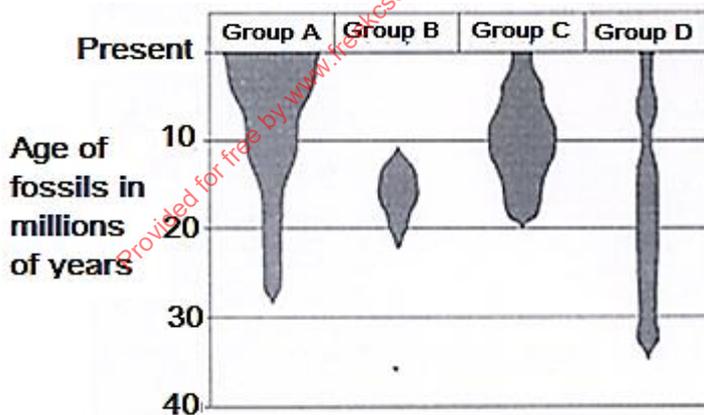
PAPER 1

(THEORY)

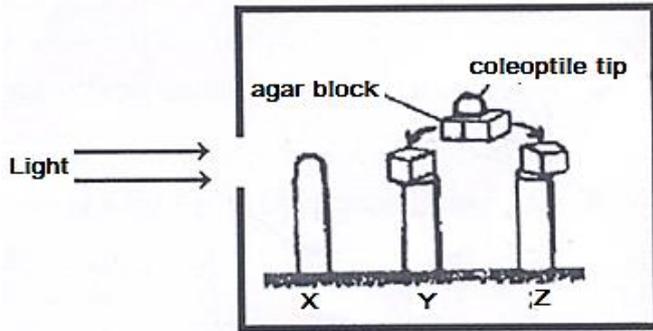
1. State the importance of nutrition in living things. (1 mark)
2. Explain how dirty lenses of a light microscope would be cleaned. (2 marks)
3. Outline **two** roles of active transport in the human body. (2 marks)
4. Explain the role of stomata in photosynthesis. (2 marks)
5. The diagram below shows a jaw of an animal.



- b) (i) State the mode of feeding of this animal. (1 mark)
- (ii) Give a reason for your answer. (1 mark)
9. Write the dental formula of the animal from which this jaw was obtained. (1 mark)
10. If a woman who cannot roll her tongue marries a man who is a tongue roller but is the son of a non-roller father, what would be the chances of them producing a non-roller child? (Ability to roll the tongue is dominant to non-rolling). (3 marks)
11. In the Grand Canyon, scientists have found fossils of several different groups of organisms. The diagram shows the number and age of the fossils that the scientists found. The width of each shaded areas shows the number of fossils found.



- a) What is a fossil? (1 mark)
- b) (i) Which group of organisms, A, B, C or D was the first to evolve? (1 mark)
- (ii) Which group of organisms, A, B, C or D, is now extinct? (1 mark)



State the expected observations in each coleoptile after a few days.

(3 marks)

12. State **two** distinguishing features of cardiac muscles.

(2 marks)

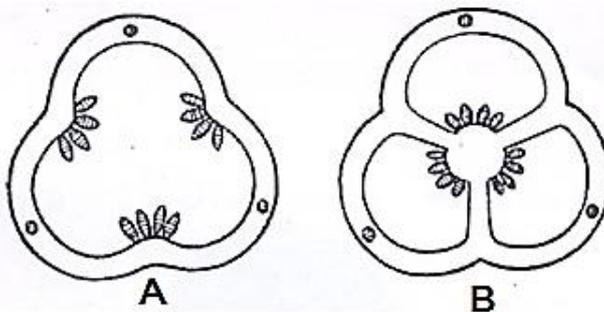
13. State **two** limitations of artificial classification.

(3 marks)

14. Distinguish between epicotyl and hypocotyl.

(2 marks)

15. The diagram below shows cross section of two fruits.



a) Name the type of pistil from which fruit A developed.

(1 mark)

b) Name the type of placentation in the fruit labeled B.

(1 mark)

c) Give an example of a fruit with the placentation in A.

(1 mark)

16. a) Small insect-eating birds are feeding on the caterpillars and are eating the leaves of a tree. A pair of sparrow hawks is hunting for small birds to feed their young.

(i) Represent the information on a food chain.

(1 mark)

(ii) Draw a pyramid of numbers of the above chain. Give the organisms at each trophic level.

(2 marks)

17. State the functional difference between the prostate and copwers glands.

(2 marks)

18. Name the:

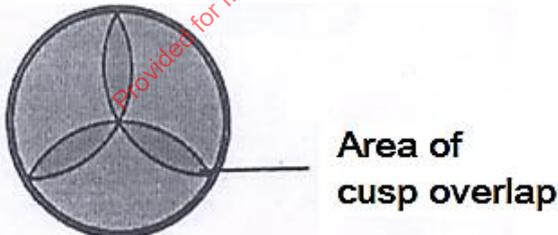
(i) Method of asexual reproduction in members of the kingdom Monera.

(1 mark)

(ii) The structure used for locomotion in members of the kingdom Monera.

(1 mark)

19. The diagram below shows a heart valve under ventral view.



a) (i) Identify the valve.

(1 mark)

(ii) Give a reason for your answer.

(1 mark)

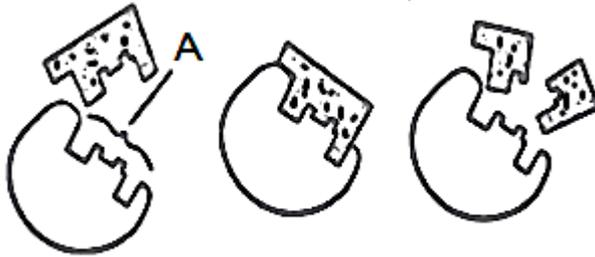
b) Where is the valve located within the heart.

(1 mark)

c) State the role of this valve.

(1 mark)

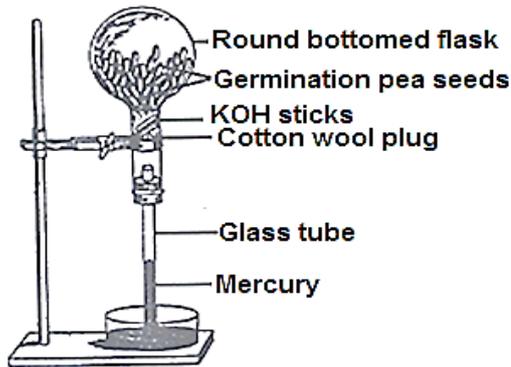
20. The diagram below shows the reaction of an enzyme.



- a) Name **two** properties of enzymes illustrated in the diagram.
 b) State **two** other features of enzymes.

(2 marks)
 (2 marks)

21. The diagram below shows an experiment.

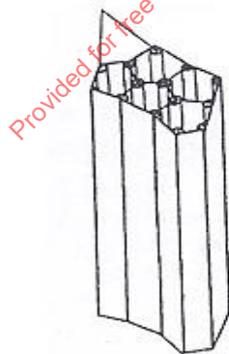


- a) State the aim of the experiment.
 b) Account for the observations.

(1 mark)
 (3 marks)

22. State **two** ways in which leaves of floating aquatic plants are adapted for gaseous exchange.
 23. State **two** features of the endodermis.
 24. a) State the function of the granular layer of the skin.
 b) Other than giving the skin its colour, state the role of melanin.
 25. State **two** roles of ribosomes on the rough endoplasmic reticula.
 26. The diagram below shows a support tissue in plants.

Thicks ribs of cellulose



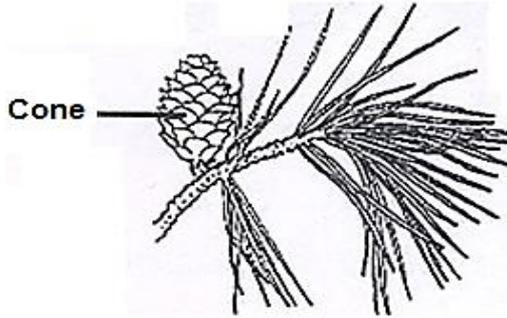
- a) Identify the tissue.
 b) Give **two** reasons for your answer.

(1 mark)
 (2 marks)

27. An ocean separated two populations of the same species of birds over a long period of time. Both populations initially fed on insects only. Later it was observed that one population fed entirely on fruits and seeds, although insects were available. Explain this type of evolutionary change.

(2 marks)

28. The diagram below shows a part of a flowering plant. Study it answer the questions that follow.



- a) (i) To which class does the plant belong? (1 mark)
 (ii) Give a reason for your answer. (1 mark)
- b) Suggest whether this is a male cone or a female cone. Give a reason for your answer. (2 marks)
29. A plastic water bottle full of water was stopped using a piece of stem obtained from a young herbaceous plant, whose epidermis had been peeled off. After 24 hours it was noted that the stopper closed the container tightly.
- a) Why was the epidermis peeled? (1 mark)
 b) Account for the observations made. (3 marks)
30. State the functions of each of the following parts of the nervous system in control of the heart beat:
- (i) The vagus nerve. (1 mark)
 (ii) The sympathetic nerve (1 mark)
31. Explain the role of pleural membranes in gaseous exchange. (2 marks)
32. Name the product of anaerobic respiration that is essential in:
- (i) The brewing industries. (1 mark)
 (ii) The bread baking industry. (1 mark)

UASIN GISHU ACK SCHOOLS
231/2
BIOLOGY
PAPER 2
JULY/AUGUST 2019

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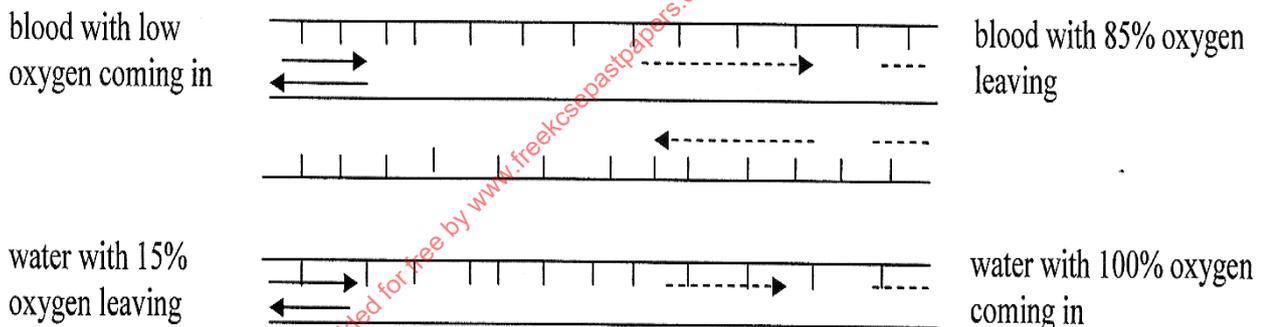
SECTION A : ANSWER ALL QUESTIONS IN THIS SECTION (40 MARKS)

1. a) Name **two** disorders in human caused by gene mutation. (2mks)
 b) Describe the following chromosomal mutations:
 Inversion (2mks)
 Translocation (2mks)
- c) In mice the allele for **black fur** is **dominant** to the allele for **brown fur**. What percentage of offspring would have brown fur form a cross between heterozygous black mice? Show working. Use letter **B** to represent the allele for **black colour**. (4mks)

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

Experiment	Treatment	Percentage germination
I	Seeds placed in tightly closed container with pyrogallic acid	0
II	i)Seeds kept on saucer in light ii)Seeds kept on saucer in darkness	96 97
III	i)Seeds kept in a refrigerator at 40 ⁰ C ii)Seeds kept in an oven at 60 ⁰ C iii)Seeds kept at 35oC	0.5 0 92
IV	i)Dry Seeds in closed container ii)Moist seeds in closed container	0 87

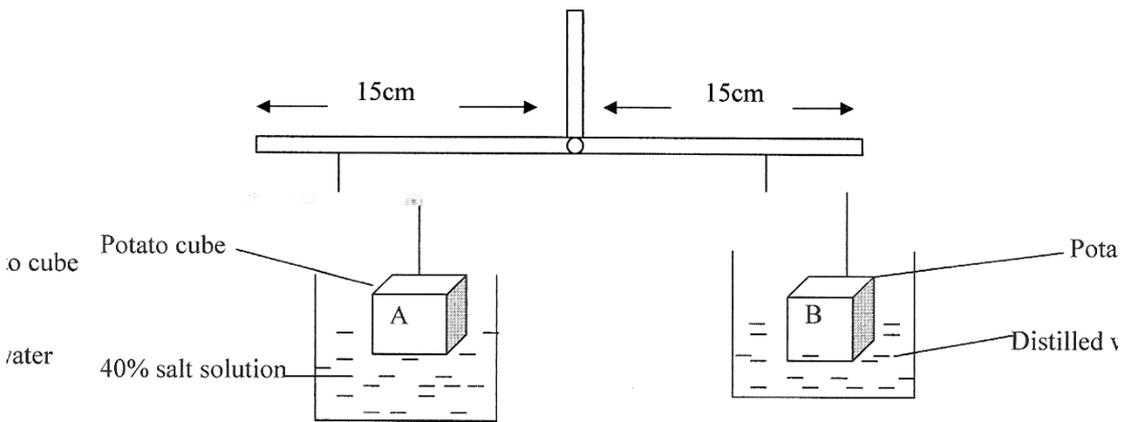
- i) What was the role of pyrogallic acid in experiment I (1mark)
 - ii) State the aim of experiment II (1mark)
 - iii) Account for the results obtained in experiment set up III (3mks)
 - iv) Name the conditions necessary for germination being investigated by experiment I, III and IV (3mks)
3. The diagram below shows how gaseous exchange occurs across the gills of a fish.



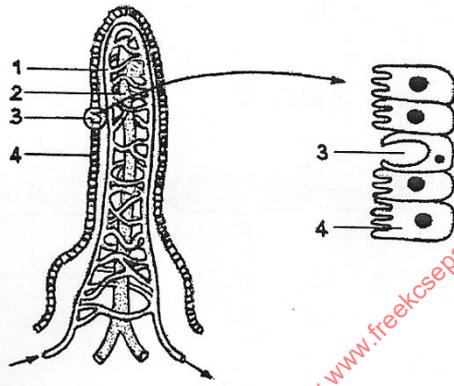
From the diagram above, water and blood flow in opposite direction.

- i) Give the term used to describe this type of flow. (1mk)
- ii) Explain the significance of this type of flow. (2mks)
- iii) Name **two** organs in human beings that display the flow system named in (a) (i) above. (2mks)
- iv) Explain why the gills of a fish are:
 - a) Highly vascularised. (1mk)
 - b) Thin walled (1mk)
 - c) Moist (1mk)

4. A student set up an experiment to investigate a certain process. Study it and answer the questions that follow. The cubes are of the same size and shape.



- (i) Name the process being investigated. (1mk)
 - (ii) What observations would be made after 40 minutes? (2mks)
 - (iii) Account for your observation. (4mks)
 - (iv) Suggest a control experiment for this experiment. (1mk)
5. The diagram below represents a villus.



- (i) State the roles of the following structures in the villus: (2mks)
 - Capillary:
 - Lacteal:
- (ii) The epithelial cells, one of which is shown enlarged on the figure have microvilli on their exposed surface. Suggest an advantage of these microvilli to the epithelial cells. (1mk)
- (iii) Name the process by which the products of digestion, present in high concentrations in the ileum, would pass into the capillaries. (1mk)
- (iv) Describe how the capillaries are adapted to allow this process to happen efficiently. (2mks)
- (v) Some substances are absorbed into the capillaries by active uptake. (1mk)
- (vi) Explain why active uptake is sometimes necessary. (1mk)
- (vii) Suggest why active uptake stops when the epithelial cells of the ileum are exposed to a respiratory poison. (1mk)

SECTION B (40 MARKS)

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

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

Time in days	Oestrogen mg/100 cm ³ of blood	Progesterone mg/100 cm 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 axis draw graphs of oestrogen and progesterone against time. (8 mks)
- b) State the possible event taking place in the uterus during the first week. (1 mk)
- c) State the events taking place in the ovary between day 1 and day 13. (2 mks)
- d) Account for the sudden increase in the progesterone concentration between day 14 and day 18. (2 mks)
- e) Account for the change in temperature between day 14 and 17. (1 mk)
- f) Account for the change of the curve of progesterone between day 19 and 27. (2 mks)
- g. State the function of the following:
- Ovary (1 mk)
 - Progesterone (1 mk)
 - Oestrogen (1 mk)
7. Describe how the following types of plants are adapted to their habitats: (10mks)
- Mesophytes (5mks)
 - Halophytes (5mks)
 - Hydrophytes (5mks)
8. Describe the structural adaptations of the mammalian heart to its (20mks)

UASIN GISHU ACK EXAM
Biology Practical confidential
July 2019

Each candidate will require the following;

1. A pinnate/bipinnate leaf, **Specimen K**
2. A complete grass plant, **Specimen H**
3. A half portion of ripe banana, **Specimen Q**
4. Spatula
5. White tile
6. test tubes
7. Glass rod
8. 10ml measuring cylinder
9. Visking tubing, about 8cm long and 2 pieces of thread.
10. Boiling tube
11. 100ml/250ml beaker.
12. Dropper
13. Hand lens

Access to:

1. Source of heat
2. Distilled water
3. Benedict's solution
4. Iodine solution

UASIN GISHU ACK EXAMS

231/3

Biology Practical.

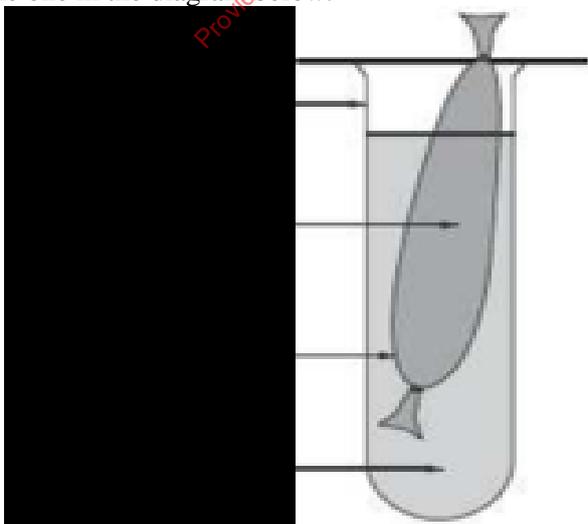
Paper 3

JULY 2019

Time: 13/4 Hours

Biology Examinations

1. You are provided with specimen Q which is a portion of part of a plant. Peel off the epicarp.
 - a) Scoop a small portion of the endocarp onto a white tile. Add a few drops of the iodine solution.
 Conclusion (1 mark)
 - b) Place about half spatula portion of the specimen into a clean test tube. Add 2 cm³ of distilled water and stir carefully. Add equal volume of Benedict's solution. Heat gently to boil.
 Conclusion (1 mark)
 - c) Using the remaining portion of specimen Q and the pieces of apparatus provided, design a set-up similar to the one in the diagram below.



i) Procedure. (5 marks)

Leave the set up undisturbed for at least 10 minutes.

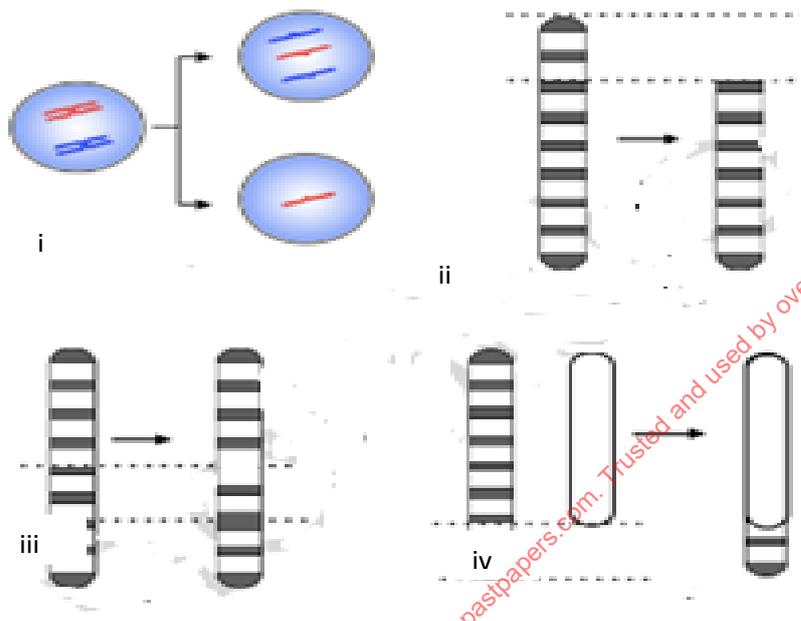
Carefully remove the visking tubing and its contents from the boiling tube.

(ii) Take portions of water from the boiling tube and test for the food substances present using iodine and Benedict's solutions. (4 marks)

Reagent used	Observation	Conclusion
Iodine solution		
Benedict's solution		

d) Develop an explanation for the results obtained in c (ii) above. (3 marks)

2. Experimental evidence shows that most mutations results to variations among organisms. The illustrations I, II, III and IV below show different possible types of chromosome mutations. Study them keenly.



a) Identify the types of chromosome mutations illustrated. (4 marks)

- Illustration Name of mutation
- I
- II
- III
- IV

b) Briefly describe the mutation illustrated in I. (3 marks)

c) State the effect of the mutation illustrated in III. (1 mark)

d) In most cases, the mutation in II could be lethal. Explain. (2 marks)

e) During which stage of mitosis does the mutation in I above occur? (1 mark)

f) i) Define a mutation (1 mark)

ii) Give two possible environmental mutagens. (2 marks)

3. You are provided with specimens H and K. Observe the specimens keenly.

(a) State two functions of specimen K. (2 marks)

(b) Name the division and class to which specimen H belongs. (1 mark)

Division..... (1 mark)

Reason (1 mark)

Class (1 mark)

Reasons (2 marks)

(c) State three adaptations of specimen K for maximum photosynthesis. (3marks)

(d) Explain two ways in which specimen H is adapted for survival in its habitat. (2 marks)

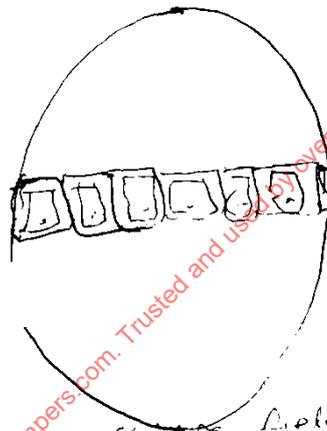
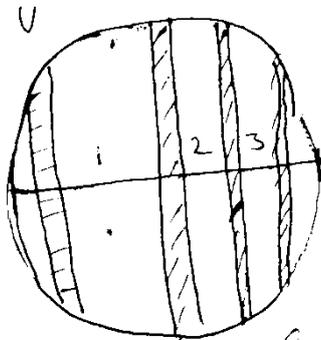
KIRINYAGA CLUSTER
SCHOOL BASED FORM 4 EXAMINATION 2019
 231/1
BIOLOGY
(THEORY)
PAPER 1

SECTION A 80 MARKS
Answer ALL the questions.

1. State the significance of caecum in herbivorous mammals (1mk)
2. Give **two** scientific skills that a student can gain by studying Biology. (2mks)
3. State **three** characteristics of the class Crustacea. (3mks)
4. A form one student observed a transparent plastic ruler with its millimeter marks on the stage and a thin piece of epidermis of onion under low power microscope and drew the below diagrams.

Microscopic field of view – ruler

Microscope field of view epidermis - cells



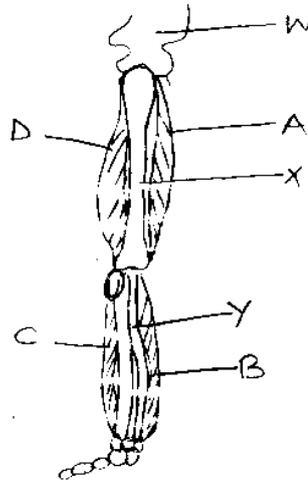
- a) Estimate the diameter of the cells in μm . (3 mks)
- b) Give reason why a transparent ruler and the thin epidermis were used? (1mk)
5. State the conditions under which the following hormones are released.
 - a) Insulin (1mk)
 - b) Anti-diuretic Hormone (1mk)
6. Name **two** types of disorders that arise due to chromosomal mutation in humans. (2mks)
7. Name **three** factors that would slow down enzyme activity. (3mks)
8. State the importance of the following features in a respiratory surface.
 - i) Moist (1mk)
 - ii) Thin epithelium (1mk)
9. a) What is natural selection? (1mk)
- b) Give **two** examples of natural selection in action seen today. (2mks)
10. The table below shows the concentration of important plant nutrients.

Ion	Concentration of pond water (ppm)	Concentration in cell sap (ppm)
Potassium	200	50
Chloride	0.5	20

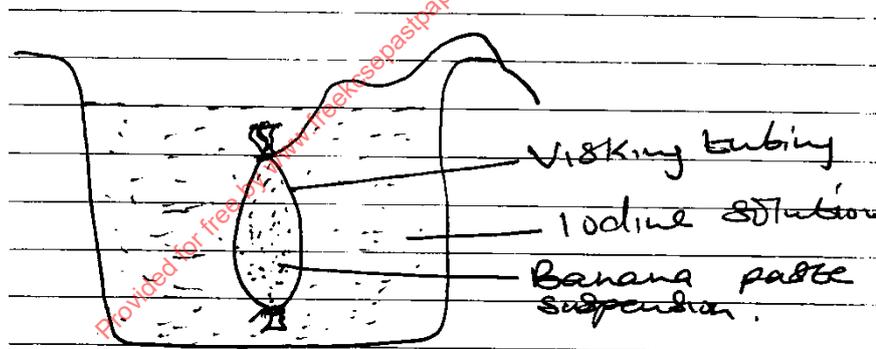
- a) Name the process by which above ions could have been taken up by the plants. (2mks)
 - i) Potassium -
 - ii) Chloride -

- b) In terrestrial plants flooding slows down uptake of certain minerals from the table above suggest with or reason the mineral whose uptake would be slowed down. (2mks)
- i) Mineral :
- ii) Reason:

11. The diagram below shows the man muscles in a human leg.



- a) Which of the muscles A to D on the figure?
- i) Must contract to raise the heel from the ground. (1mk)
- ii) Is antagonistic to the muscles named in a (i) above. (1mk)
- b) What type of joint is formed between bones labeled?
- i) W and x. (1mk)
- ii) X and Y (1mk)
12. a) Name the condition in which both alleles express themselves equally. (1mk)
- b) Give an example of the above condition in humans. (1mk)
13. In an investigation raw banana was peeled, mashed into a paste and was treated as shown in the set-up below.

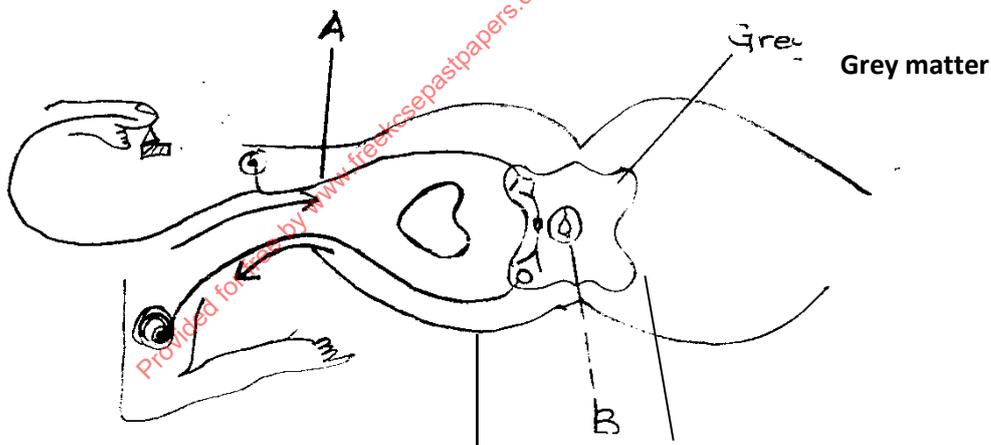


- a) Name the physiological process being investigated. (1mk)
- b) State the expected colour of the solution inside and outside the visking tubing after 30 minutes.
- Inside (1mk)
- Outside (1mk)
- c) Explain the observation made in b above. (2mks)

14. State on environmental hazard illustrated by the photograph below.



- a) Environmental hazard. (1mk)
 - b) Give **three** effects of the hazard to living organisms. (3mks)
 - c) Give **two** control of the environmental hazard. (2mks)
15. State the function of contractile vacuole found in aquatic micro-organisms (1mk)
16. Explain why cells of an endosperm are triploid and not haploid. (2mks)
17. The diagram below illustrates a reflex action.



- a) Identify the type of reflex action demonstrated in the diagram above. (1mk)
 - b) Label the neurone labeled A and C (2mks)
 - c) State **two** functions of the fluid found in part marked B. (2mks)
18. What is the significance of a counter flow system in urine formation? (2mks)
19. Name **three** processes by which water moves up in xylem vessels. (3mks)
20. State **two** ways in which auto digestion in human beings is prevented. (2mks)
21. State the role of complete metamorphosis in insects. (2mks)
22. Explain why plants do not require specialized excretory organs. (2mks)
23. State **two** causes of mutations. (2mks)
24. Explain how the following parts of a female reproductive system are adapted to function.
- i) Fallopian tube. (2mks)
 - ii) Uterus (2mks)
25. Differentiate between population and community. (2mks)
26. Give **four** control measures of Malaria. (4mks)

27. Name the part of the brain responsible for:- (3mks)
- Maintaining balance of the body.
 - Thermoregulation and osmoregulation.
 - Sensation of pain, touch and sight.
28. State **three** factors that determine energy requirements in human beings. (3mks)

KIRINYAGA CLUSTER
SCHOOL BASED FORM 4 EXAMINATION 2019
231/2
BIOLOGY
(THEORY)
PAPER 2
July / August 2019

SECTION A (40 MARKS)

Answer all questions in this section in the spaces provided.

1. The diagram below shows one of the plants



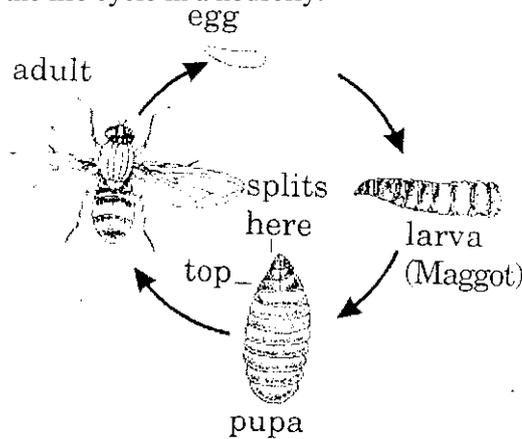
- Give the following taxonomic units the plant belongs (4mks)
 - Division - _____
 - Class - _____
 - Order - _____
 - Family - _____
 - What is the botanical name of the above plant? (1mk)
 - Give **one** economic importance of the above plant? (1mk)
 - From your observation what is the agent of pollination in the above plant? (1mk)
 - Give a reason for your answer in C (i) above
2. a) The diagram below shows certain animal cells



- What is the name of the above cells? (1mk)
- Give the function of the cells named in C (i) above (1mk)

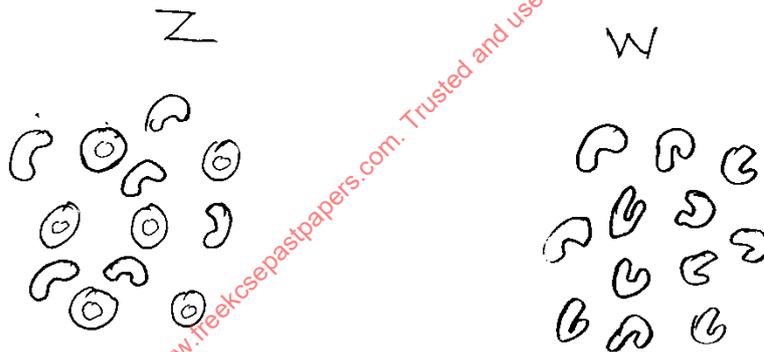
- iii) Give **three** adaptations of the above named cells to their functions. (3mk)
 (b) Describe how transpiration pull enable upward water movement in plants? (3mks)

3. a) The diagram below shows the life cycle in a housefly.



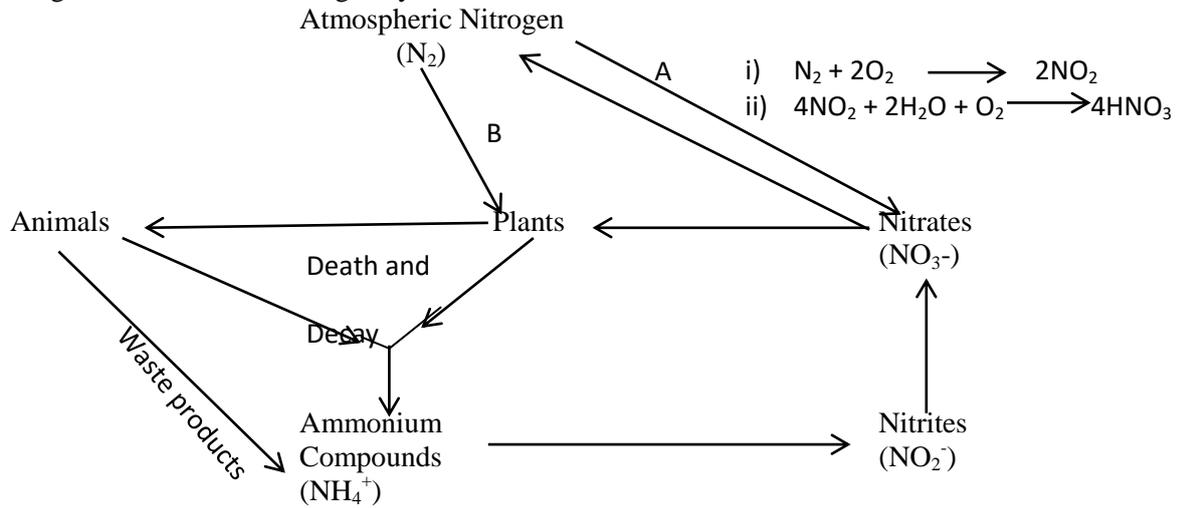
- i) Name the type of life cycle exhibited by the housefly. (1mk)
 ii) Give reason for your answer in (a) (i) above. (1mk)
 iii) Give **one** advantage between the larva and adult housefly. (1mk)
 iv) Name the type of growth curve housefly has. (1mk)
 b) Briefly describe apical growth in a shoot. (4mks)

4. Below are blood cells from two individuals Z and W.



- a) Give the phenotypes of the two individuals. (2mks)
 b) Use Hb^A for normal haemoglobin and Hb^s for abnormal haemoglobin give the genotypes of the above two individuals. (2mks)
 c) If one of the individuals above is a male and the other one is a female, work out cross between them after marriage. (3mks)
 d) Give **one** difference between normal and abnormal haemoglobin. (1mk)

5. The diagram below shows nitrogen cycle.



- a) What is the importance of nitrogen in living things? (1 mk)
- b) i) Name the process A (1mk)
- ii) Name the catalyst for the process A (1mk)
- c) Describe how nitrogen is converted into nitrates in process B? (5mks)

SECTION B (40 MARKS)

In this section answer question 6 (compulsory) and either question 7 or 8 in the spaces provided after question 8.

6. In a laboratory experiment to investigate the population growth of mice, 20 young mice were placed in a cage and supplied with the same amount of food and water every day.

The resulting number of mice is shown in the table below.

Days	0	25	50	75	100	125	150	175	200	225
Number of mice	20	20	64	190	420	870	525	350	190	80

- a) i) Draw a graph showing the population against time. (6mks)
- ii) What is type of curve in the above? (1mk)
- b) With reference to the above drawn curve, account for the change of mice population between:-
 - i) 0 to 25 days (2mks)
 - ii) 25 to 125 days (3mks)
 - iii) 125 to 225 days (2mks)
- c) i) From the growth curve suggest at which period the growth rate was fastest; giving one reason for your answer. (2mks)
- ii) Calculate the population growth rate during this period. (3mks)

Answer either question 7 or 8 in the spaces provided after question 8

7. a) Describe the process of photosynthesis in plants. (10mks)
- b) Trace the path of glucose in starch to reach the kidneys. (10mks)
8. a) Describe causes of water pollution and their control. (10mks)
- b) Describe how carbon (IV) oxide in the liver reaches into the lungs and released into the atmosphere. (10mks)

SCHOOL BASED FORM 4 EXAMINATION 2019
231/3 BIOLOGY
Paper 3 Practical
July/August 2019

Confidential

1. 3 Visking tubings each 6cm long.
2. 6 pieces of strings.
3. A scalpel.
4. 250ml beaker.
5. Distilled water.
6. Glass rod or wooden splint.
7. Concentrated Iodine solution (about 6m/s). Labelled Solution B.
8. Starch solution. Labelled solution A.
9. Clock/measure of timing.
10. A piece of liver about 1cm³ labelled R.
11. 6 labels.
12. A white tile.
13. 2 boiling tubes.
14. 10mls Hydrogen peroxide.
15. Mortar and pestle.
16. 100mls empty beaker.
17. One test tube.
18. 10% NaOH solution.
19. 10% CuSO₄ solution with a dropper.
20. 10mls measuring cylinder.
21. Distilled water in a beaker labeled C.
22. A transparent ruler.

KIRINYAGA CLUSTER

231/3

BIOLOGY

(PRACTICAL)

PAPER 3

JULY/AUGUST 2019

TIME: 1 3/4 HOURS

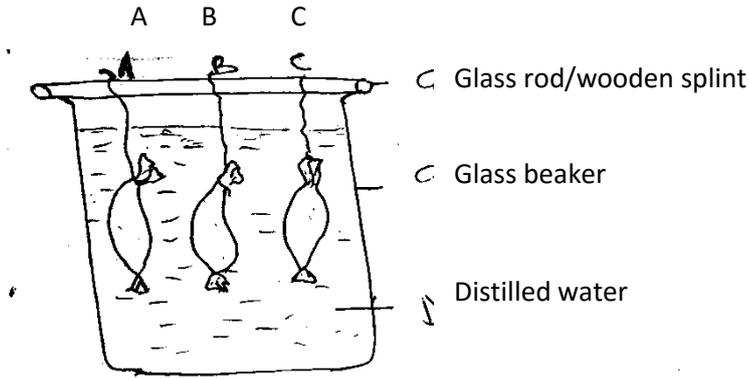
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1. You are provided with three visking tubings measuring 6cm each, six pieces of strings, scalpel, solutions A, B and C, a beaker, distilled water and glass rod. Carry out the experiment below.

Take one visking tubing and tie one side such that it air and water tight. Put 4cm³ of solution A into the visking tubing. Tie the open end tightly. Rinse the surface of the visking tubing with water and place it on a dry clean surface.

Repeat the procedure with the second and third visking tubing and fill them with solutions B and C respectively. Label the visking tubings A, B and C.

Suspend the three visking tubings in distilled water as shown below. Let it stand for 20 minutes.



- a) Record the changes observed in visking tubings A and B.
 - i) Visking tubing A. (1mk)
 - ii) Visking tubing B. (1mk)
- b) Account for the changes in visking tubing A and B.
 - i) Visking tubing A (2mks)
 - ii) Visking tubing B (2mks)
- c) What physiological process are taking place in visking tubings? (2mks)
 - i) A (2mks)
 - ii) B (2mks)
- d) Explain your answer C(i) and (ii) above. (2mks)
- e) What was the purpose of set up C in the experiment. (1mk)

2. You are provided with specimen R. Cut the specimen into three equal pieces and label them A, B and C. Boil portions A in water for 10 minutes. Cut portion B into very small pieces on a white tile. Place portion A and all the pieces from portion B into separate boiling tubes containing 5ml of Hydrogen peroxide simultaneously.
 - a) i) Record your observations. (2mks)

Portion / Pieces	Observation
A	
B	

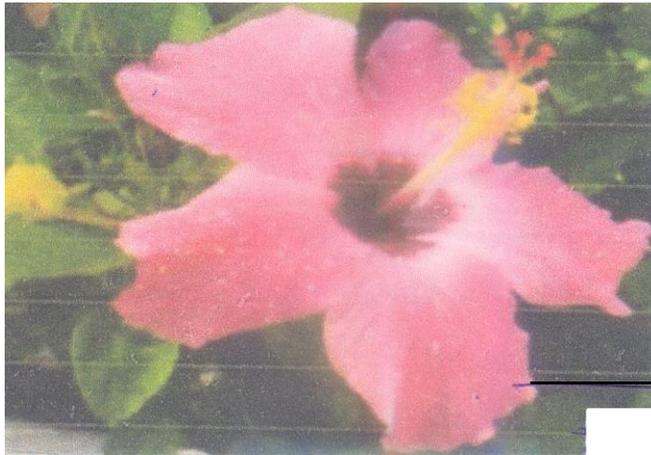
- ii) Account for the observations made in 2 (i) above.
 - Portion A (2mks)
 - Portion B (2mks)
- iii) Name the enzyme responsible for the reaction in portions/pieces B. (1mk)
- iv) Write a word equation for the reaction in portion/pieces B. (1mk)

- b) Grind portion C of specimen R using a mortar and pestle. Add 5mls of water as you grind. Decant the extract into test tube. Test for the food present in the extract using the reagents provided. (4mks)

Food	Procedure	Observation	Conclusion

- c) Name the deficiency disease caused by lack of the food substance identified above in the diet. (1mk)
- d) State **two** properties of the food substance identified in (b) above. (2mks)

3. Study the photograph of specimen P below and answer the questions that follows.



- a) Identify the reproductive organ. (1mk)
- b) Classify the plant from which the organ was obtained under the following Taxa. (1mk)
- i) Division (1mk)
 Reason (1mk)
- ii) Class (1mk)
 Reason (1mk)
- c) On the photograph identify structure X (1mk)
- d) Suggest the possible agent of pollination of the specimen. (1mk)
 Give **two** reasons (2mks)
- e) Name **one** observable structure where haploid cells are made and name them. (1mk)
 Structure (1mk)
 Name of cells (1mk)
- f) Calculate the magnification of the photograph if the real organ was measuring 10cm. (3mks)

**KIRINYAGA CLUSTER
BIOLOGY 231/1
MARKING SCHEME
JULY/AUGUST 2019**

1. Harbour useful bacteria that digest cellulose ;
 Reject. Digest cellulose
2.
– Observing ; - recording ; - Analysing;
– Identifying; - measuring; - evaluating
– Drawing; - classifying; data; First -2
3. Fused head and thorax cephalothorax often protected by carapace;
– Gaseous exchange through gills;
– Two pair of antennae;
– 5 – 20 pairs of limbs;
– A pair of compound eyes;

First 3

4. a) Diameter = $\frac{\text{Diameter of field in Um}}{\text{Number of cells across the field ;}}$
 of the cells

$$= \frac{3000\text{Um ;}}{6 \text{ cells}}$$

$$= 500\text{um ;}$$