

# **KCSE 2024 KEY AREAS**

## **BIOLOGY**

**{413 BIOLOGY PREDICTION QUESTIONS}**

**{COMMONLY KCSE TESTED QUESTIONS}**

*A Series of KCSE 2024 Prediction Questions  
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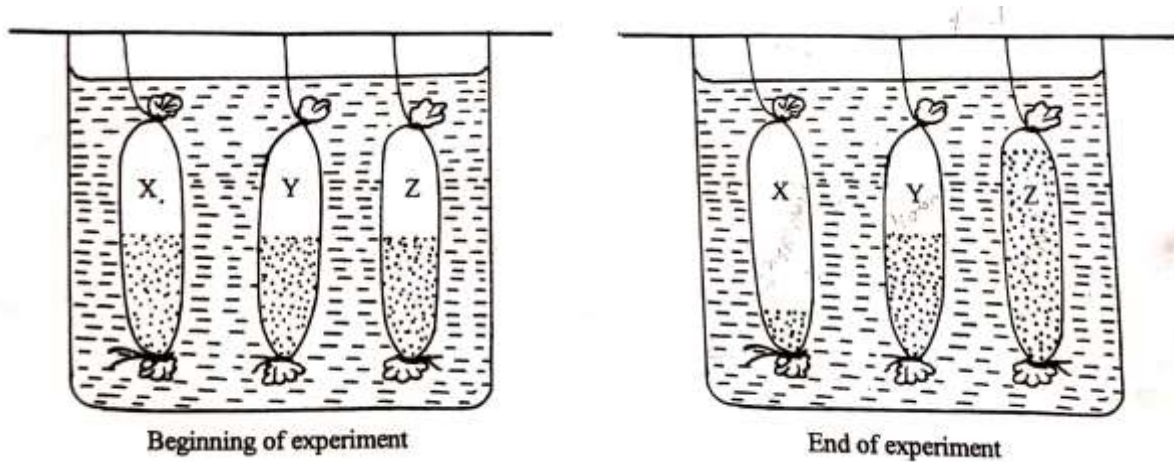
**SECTION A(231/1 BIOLOGY PAPER 1)**

**{QUESTIONS 1-258}**

1. Name **two** branches of microbiology (2marks)
2. Give **two** important functions of a fruit with regard to a plant (2marks)
3. Construct a food chain with the following: (1mark)  
Orange fruit, large bird, fruit fly, small bird
4. A student wrote the scientific name of Baobab tree as *adansonia Digitata*.
  - (a) Identify two mistakes made by the student (2marks)
  - (b) Identify the species name (1mark)
5. State the differences between light and electron microscopes in terms of the following: (2marks)
  - (a) way of illumination
  - (b) Source of illumination
  - (c) State two factors to consider the type of microscope to be used in a given biological investigation (2marks)
6. Explain how parasitism differ from predation (2marks)
7. (a) Explain how papain is used as a meat tenderizer in food processing industries (2marks)
  - (b) Name a plant excretory product that is toxic to plasmodium (1mark)
8. Distinguish between ilium and ilium (1mark)
9. Explain why Egyptian mummies are not regarded as fossils (1mark)

10. Explain what would happen to digestion and blood sugar regulation if the pancreatic duct of a mammal was blocked. (3marks)

11. Equal amounts of three different sugar solutions were placed in the visking tubings X, Y and Z. the tubings were placed in a beaker of water containing 5% sugar solution. The set up was left for two hours. The results were as shown below.

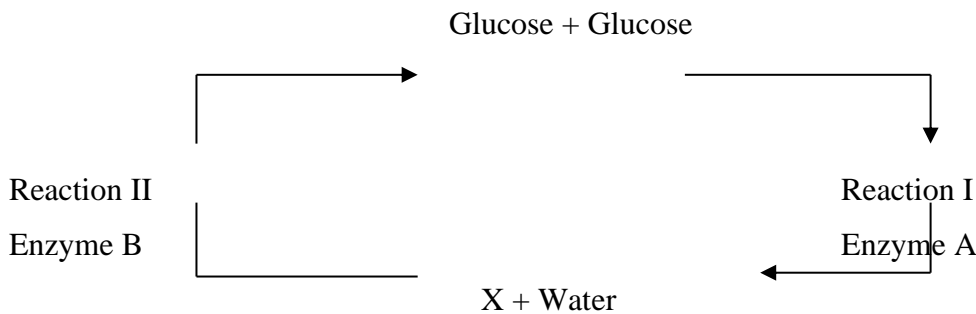


(a) Name the process being tested in this experiment (1mark)  
 (b) Account for the observation (3marks)

12. (a) Define the term allergy (1mark)  
 (b) Distinguish between allograft and isograft (2marks)

13. State **two** adaptations of the placenta to its function (2marks)

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



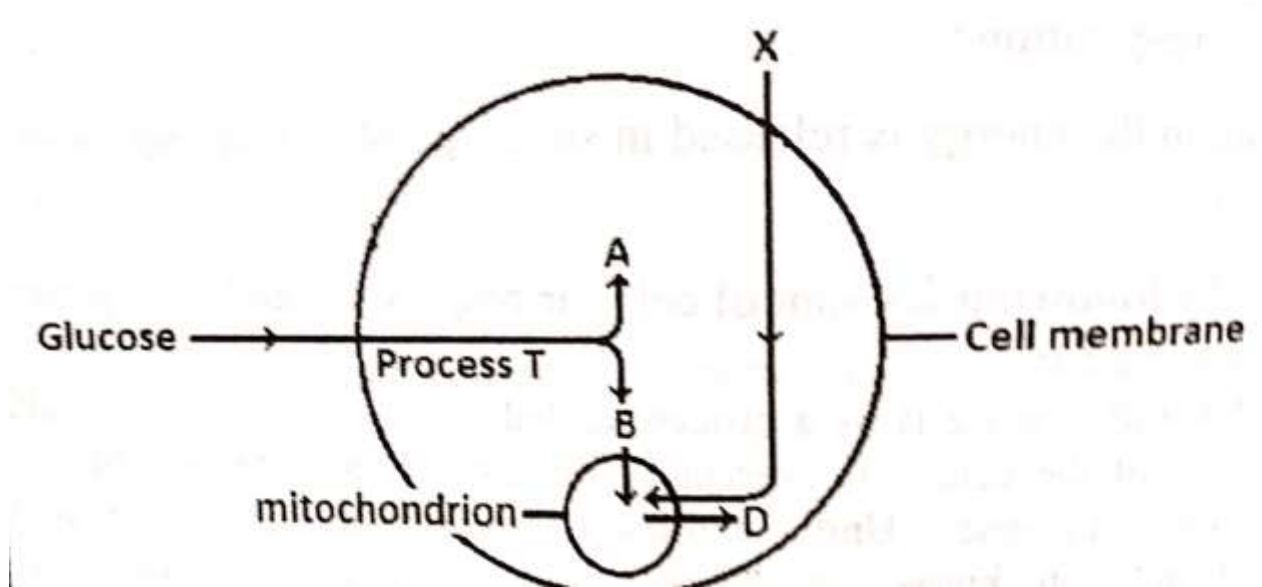
(i) Into which class of carbohydrates is X? (1mark)

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

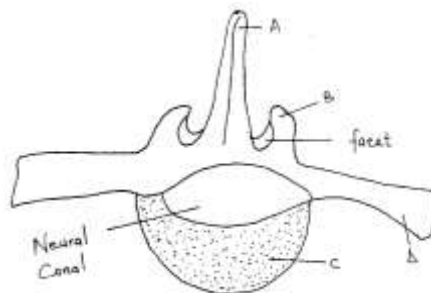
Reaction I.....

Enzyme A.....

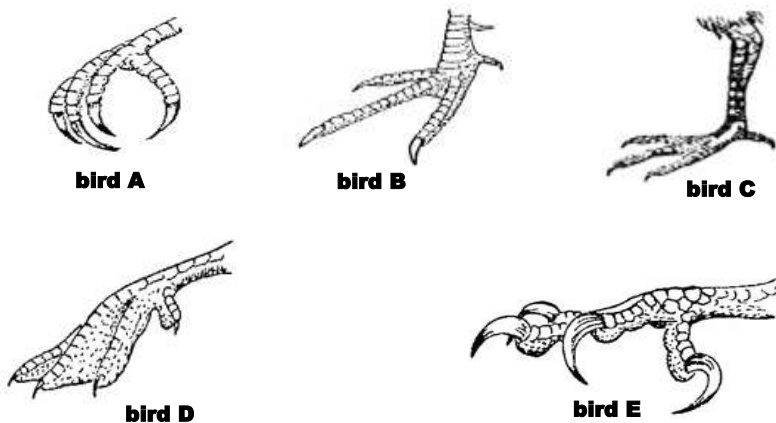
15. The figure below illustrates aerobic respiration in a cell



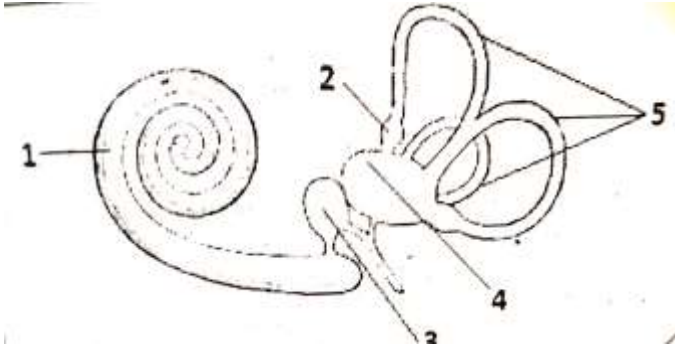
- (a) Name the raw material named X and products A and B (3marks)
- (b) Identify process T (1mark)
- 16. Name a characteristic in man controlled by multiple alleles (1mark)
- 17. Some scientists argue that Lamarck's theory is false and not valid. What is your scientific view on this? (3marks)
- 18. State **two** natural ways in which in which seed dormancy can be terminated (2marks)
- 19. Explain why the temperate bears have thick adipose tissues (2marks)
- 20. Study the diagram shown below of the anterior view of a lumbar vertebra of a mammal.



- (a) Name the parts labelled: A, and B, (2 marks)
- (b) State the adaptation of the part labelled D. (1 mark)
21. Distinguish between parthenocarpy and parthenogenesis (2marks)
22. State **three** symptoms of menopause (3marks)
23. The figure below shows feet of various birds. Study the diagram and answer the questions that follow.



- (i) Name the type of evolution represented by the diagrams. (1 mark)
- (i) Using Darwin's theory of evolution, explain how the feet of **bird E** would have evolved. (3 marks)
24. Describe how contraction of the diaphragm muscles leads to inhalation (4marks)
25. Explain the effect of burning of fossil fuels on the health of humans (3marks)
26. State **two** distinguishing characteristics of members of the kingdom Monera (2marks)
27. State **two** structural differences between the xylem and the phloem (2marks)
28. Explain why seeds buried deep in the soil fail to germinate (2marks)
29. Explain how starch provides energy for living organisms (2marks)
30. The diagram below shows part of the inner ear



- (a) Name the apparatus (1mark)
- (b) State the function of the apparatus (1mark)
- (c) Name the parts labeled 1 and 5 (2marks)
31. (a) state the role of the following hormones during lactation (2marks)
- (i) Prolactin
- (ii) Oxytocin
- (b) Other than the role mentioned above, give another role of oxytocin in the body of a female (1mark)

32. 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)

33. Which organelles should be abundant in;

i) Skeletal muscle (1mk)

ii) Palisade tissue (1mk)

34. 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)

35. Why are lysosomes many in phagocytic cells (2mks)

36. Differentiate between guttation and transpiration (2mks)

37. a) Give a reason why xylem vessel should be dead (1mk)

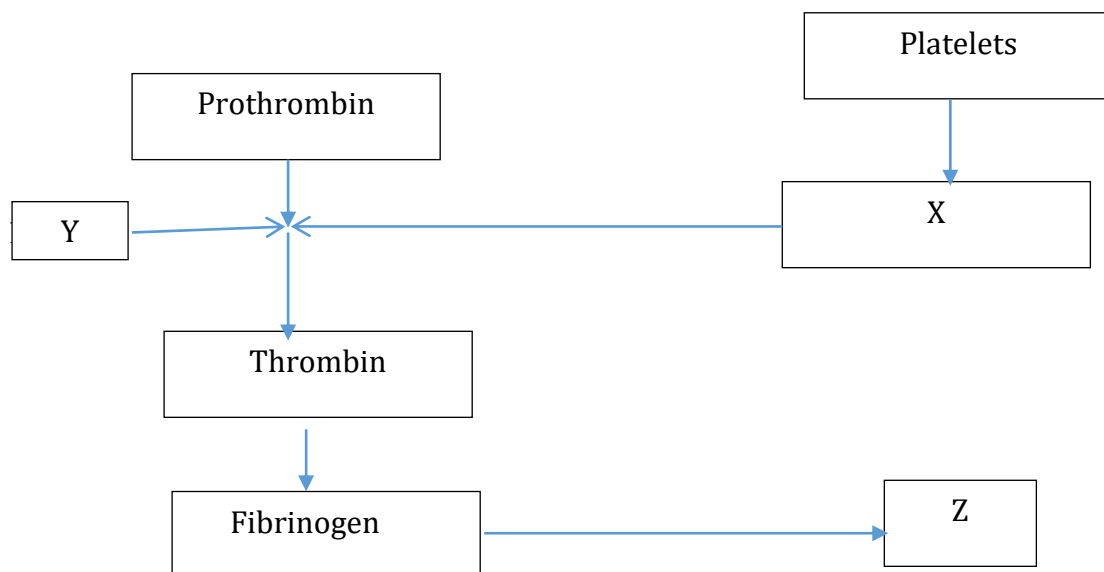
b) What is the role of lignin in the wall of the xylem vessel (1mk)

38. Name the disease of the blood characterized by,

a) Abnormally large number of white blood cells (1mk)

b) Crescent-shaped haemoglobin (1mk)

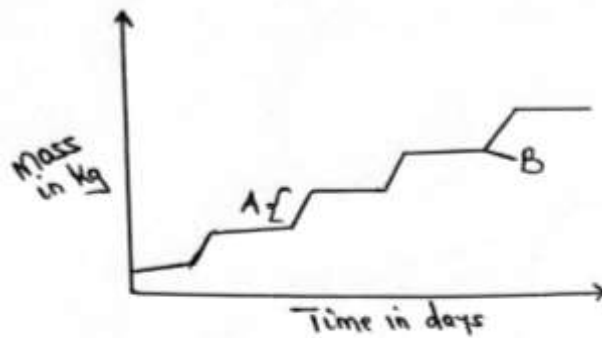
39. The chart below is a summary of blood clotting mechanism in a man.



Name;

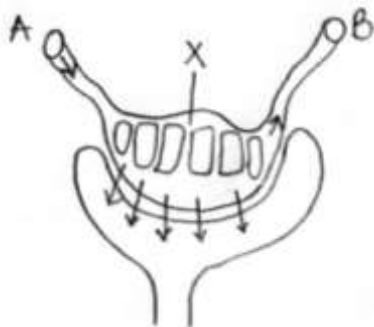
- i) The metal ion represented by Y (1mk)
- ii) The end product of the mechanism represented by Z (1mk)

40. 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)
41. Explain why a mule is infertile (1mk)
42. Phylum Arthropoda is the most successful of invertebrates. Explain two characteristics that make them most successful (2mks)
43. Name phylum whose members possess a notochord (1mk)
44. a) Define evolution and homologous structures (2mks)
- b) State three limitations of using fossil records as an evidence that supports organic evolution (3mks)

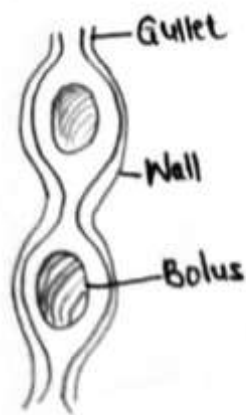
45. The following is part of a kidney nephron





- 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)

46. The diagrammatic representation below illustrates one of the process 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)

47. 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)

48. State the economic importance of the following plant excretory products (3mks)

- a) Papain
- b) Caffein
- c) Colchicine

49. 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)

50. State the function of the following during pregnancy (3mks)

- a) Amnion
- b) Amniotic fluid
- c) Umbilical cord

51. 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)

52. 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)

53. State any two methods that can be used at home to properly manage domestic effluents (2mks)

54. 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)

55. 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)

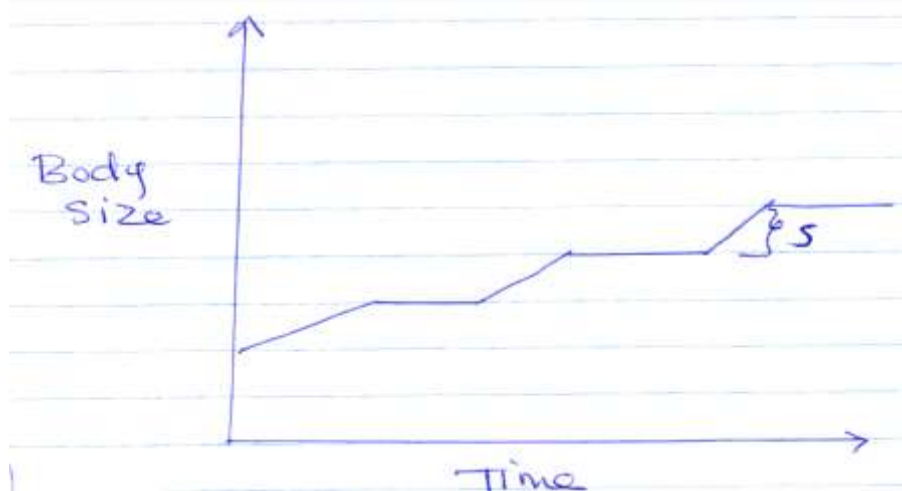
56. The diagram below represents a gill of a fish



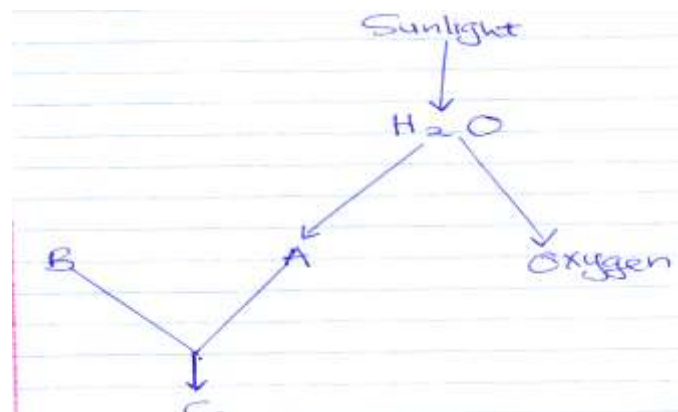
- i) State two ways in which a large surface area is created in structures labelled K (2mks)
- ii) Name the type of flow system that occurs between water and blood in the capillaries present on structures K (1mk)
- iii) Name an organ in human beings that also display the flow system named in (ii) above (1mk)
57. 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)

58. Name the cell organelles that would be abundant in:
- a) White blood cells destroying pathogens 1mk
  - b) Palisade mesophyll cells 1mk
  - c) Skeletal muscle cells 1mk

59. The following graph represents a growth pattern observed in a group of animals



- a) Name the type of growth shown above (1mk)
  - b) Name the phylum of animals whose members display the growth pattern named in (a) above (1mk)
  - c) Identify the process which leads to increase in body size at the part marked S (1mk)
60. (a) When observing a specimen through a light microscope, a student noted that the field of view was dark. Name 2 parts of the microscope that the student should adjust to make the field of view clear (2mks)
- b) A specimen was magnified 1000 times by a light microscope whose eye piece lens magnification is x10. Calculate magnification of objective lens (2mks)
61. The flow diagram below represents a process of photosynthesis. Study diagram and answer the questions that follow



(a) Name the substances labeled (3mks)

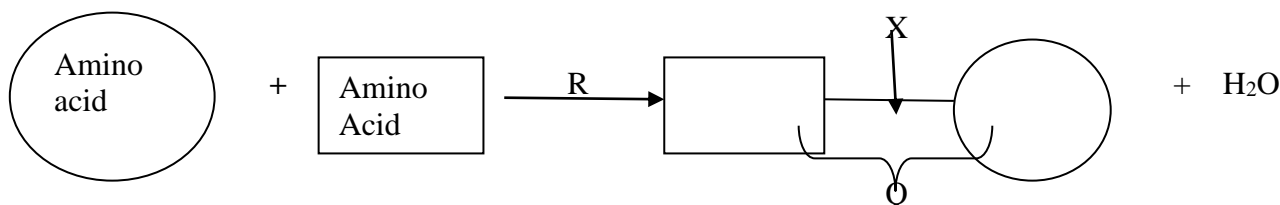
- A .....
- B .....
- C .....

(b) Write an equation to show the process illustrated above (1mk)

62. Name the parts of the body of a mammal where each of the following types of joints are found (3mks)

- (i) Fixed joints
- (ii) Gliding joint
- (ii) Huge joint

63. The following is a diagrammatic representation of protein synthesis. Study and answer the questions that follow.



- (a) Name process R (1mk)
- (b) Where in the cell does R take place? (1mk)
- (c) Name
  - (i) Product Q (1mk)
  - (ii) Part X (1mk)

64. (a) Name an element which is present in proteins but is not in carbohydrates (1mk)  
 (b) State three functions of proteins in the human body (3mks)

65. State the functions of the following cell structures during cell division (2mks)

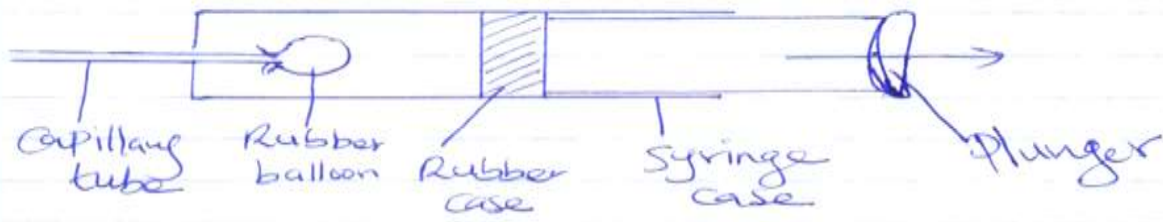
- (i) Centriole
- (ii) Centromere

66. In a blood test, a few drops of anti- serum were added to two samples of blood. It was observed that agglutination occurred. What were the possible blood groups of the two blood samples (2mks)

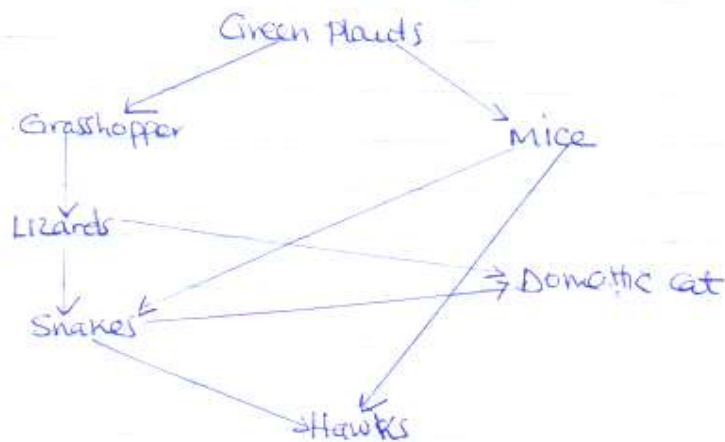
67. Name the division of the kingdom Plantae with the following spores producing bodies (2mks)

- (i) Sori
- (ii) Sporangium

68.



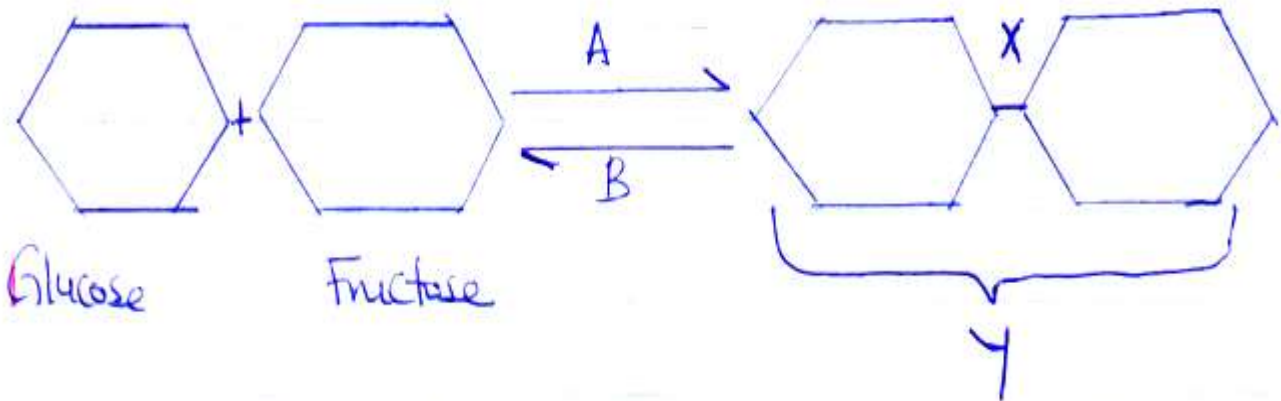
- (a) What structure in a mammal is represented by the following? 3mks
- (i) The rubber balloon
  - (ii) The syringe case
  - (iii) The plunger
- b) Describe what happens if the rubber plug is pulled in the direction shown by the arrow (1mk)
69. (a) Define the term alleles (1mk)
- (b) Explain why the body temperatures of a healthy human beings must rise up to  $39^{\circ}\text{C}$  on a humid day (2mks)
- (c) In an experiment, a piece of brain was removed from a rat. It was found that the rat had large fluctuation of body temperatures. Suggest the part of the brain that had been removed (1mk)
70. Name the causative agent of the following diseases in humans (2mks)
- (a) Ameobic dysentery
  - (b) Candidiasis
71. (a) Define the term immunity (1mk)
- (b) Distinguish between natural immunity and acquired immunity (2mks)
- (c) Identify one immunizable disease in Kenya (1mk)
72. The chart below shows a feeding relationship in a certain ecosystem



- (a) Construct two food chains ending with a tertiary consumer in each case (2mks)
- (b) Suggest two ways in which the ecosystem would be affected if there was a prolonged drought (2mks)

73. State two functions of muscles found in the alimentary canal of mammals (2mks)

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



(a) What biological processes are represented by A and B (2mks)

A

B

(b) Identify the product Y (1mk)

(c) State the bond represented by X (1mk)

75. State one use of each of the following plant excretory products

(a) Tannins (1mk)

(b) Colchines (1mk)

(c) Quinine (1mk)

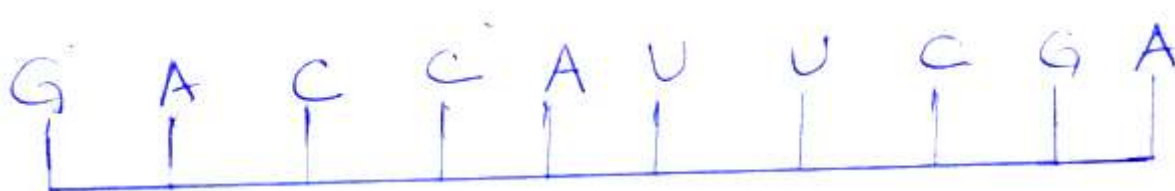
76. State two characteristics of aerenchyma tissue (2mks)

77. The table below shows the percentage composition by volume of inhaled and exhaled air

Gas	Inhaled air %	Exhaled air %
Oxygen	21	16

Carbon(iv) oxide	0.04	4.0
Nitrogen	79	79

- (a) By what percentage is carbon (iv) oxide concentration in inhaled air higher than exhaled air (2mks)
- (b) Explain the differences in the composition of the gases between inhaled and exhaled air (3mks)
- 78 (a) what is metamorphosis (1mk)
- (b) What is the biological importance of the larval stage during metamorphosis (2mks)
79. Explain how the following forces contributes to the movement of water up the xylem vessels (2mks)
- (a) Cohesion
- (b) Adhesion
80. A solution of sugarcane was boiled with hydrochloric acid; sodium hydrogen carbonate was added to the solution which was then heated with benedict’s solution. An orange precipitate was formed
- (a) Why was the solution boiled with hydrochloric acid? (1mk)
- (b) To which class of carbohydrates does sugarcane belong? 1mk
- (c) State the form in which carbohydrates are stored in (2mks)
- (i) Plants
- (ii) Animals
81. How are lenticels adapted for gaseous exchange? (2mks)
82. State the importance of the following process that takes place in the nephrons of human kidney
- (a) Ultrafiltration (1mk)
- (b) Selective reabsorption (1mk)
83. The diagram below represents a section or portion of a certain nucleic acid



With a reason, identify the types of nucleic acid whose portion is shown above

Identity 1mk

Reason 1mk



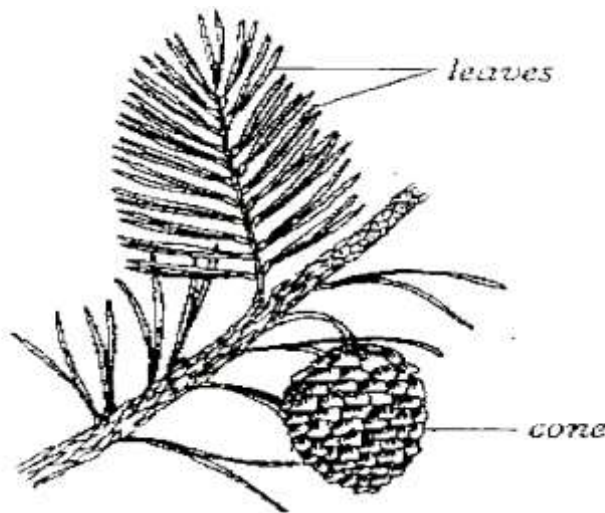
84. Give the role of the following parts of microscope. (3marks)

- i) Mirror
- ii) Diaphragm
- iii) Coarse adjustment knob

85. (a) What **three** characteristics are used to divide the phylum arthropoda into classes?

(3mks)

(b) The diagram below represents a certain plant species.



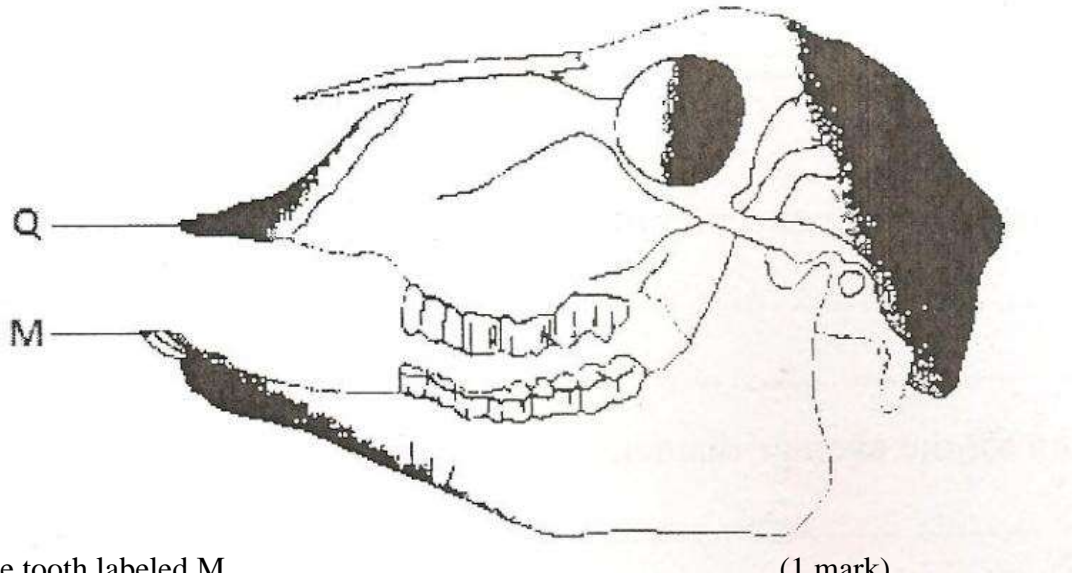
i) State the class to which the plant belongs. (1 mark)

ii) State two differences between members of Gymnospermaphyta and Angiospermaphyta (2 marks)

Gymnospermaphyta	Angiospermaphyta

iii) State one observable xerophytic characteristic seen in the diagram above. (1mark)

86. The following specimen was collected by form two students during a nature walk.



(a) Name the tooth labeled M. (1 mark)

(b) Name the part labeled Q and state its role. (2 marks)

Name:

Role:

87. A solution of sugarcane was boiled with hydrochloric acid; sodium carbonate was added; cooled and benedict's solution was added then boiled. An orange precipitate was formed.

(a) Why was the solution boiled with hydrochloric acid? (1mark)

(b) Why was sodium carbonate added? (1mark)

(c) Name the type of reaction that takes place when simple sugars combine to form complex sugar. (1mark)

88. (a) Define the following terms as used in ecology. (2 marks)

- i) Biosphere
- ii) Biomass
- (b) Form three students wanted to estimate the population of grasshoppers in 8km<sup>2</sup> grass field near a school compound. They captured 72 grasshoppers and marked them before returning them back to the field. After three days they made another catch of grasshoppers. They collected 147 grasshoppers of which only 29 had marks.
- i) State why the second capture was done after three days. (1 mark)
- iii) From the data, calculate the population size of grasshoppers in the grass field. (2 marks)

89. a) State the most suitable biological tool for collecting the following organisms:-

- i) A moth from a farm. (1 mark)
- ii) Ants from a tree trunk. (1 mark)

90. The diagram below represents an organ from a finned bony fish. Study it and answer the question that follows



- i. Identify the organ illustrated above. (1mark)
- ii. State three adaptations of the part labeled S to its functions. (3 marks)

91. a) State two characteristics that researchers select in breeding programs in plants (2marks)

b) In a maize the gene for purple colour is dominant to the gene for white colour. A pure breeding maize plant with purple grains was crossed with heterozygous plant. Using letter G to represent the gene for purple colour, work out the genotypic ratio of the offspring.

(2 marks)

92. a) Name the organelle where Krebs's/ citric acid cycle take place in a cell.

(1mark)

b) In which organelle is each of the following found:

( 2mark)

i) Lytic enzymes .....

ii) Chromosomes .....

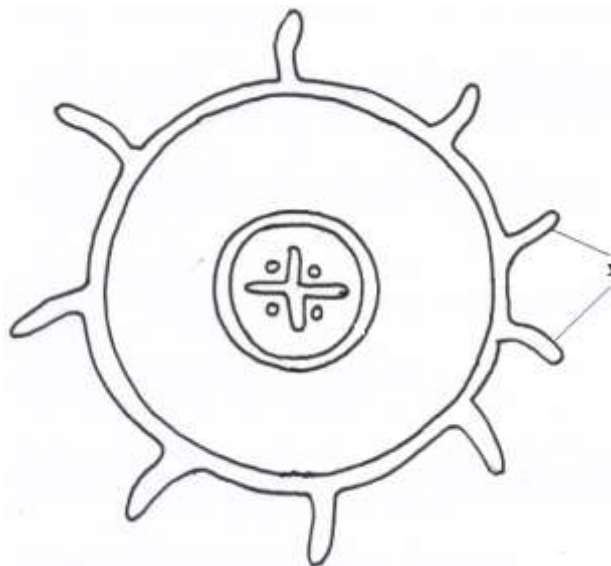
93. State the importance of osmo- regulation in organisms

( 2 marks)

94. Explain why unicellular organisms such as paramecium lack complex organs for gaseous exchange.

( 2marks)

95. The diagram below represents a transverse section of a plant part. Study it and answer the questions that follow.



a) Name the class in which the plant belongs.

( 1mark)

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

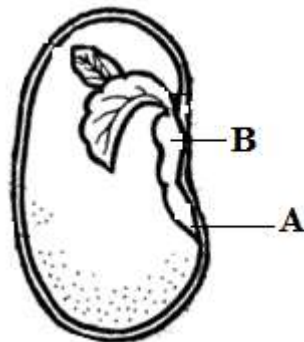
c) State **one** adaptation for the structures labeled X to their functions. (1mark)

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

(a) Semi – circular canals. ( 1mark)

(b) Eustachian tube. ( 1mark)

97. The diagram below shows the internal structure of a broad bean seed. Study it and answer the questions that follow.

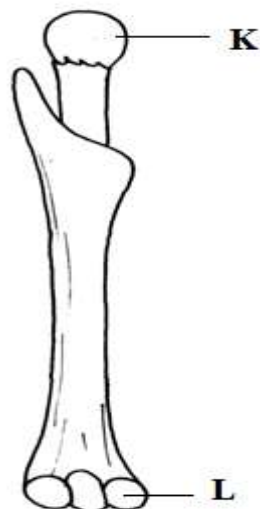


(a) Name the part labeled B. (1 mark)

(b) Why is it important that the part labeled A develops first during germination?

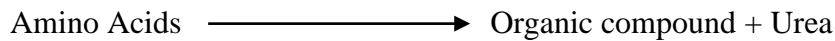
( 2 mark)

98. The diagram below represents a mammalian bone.



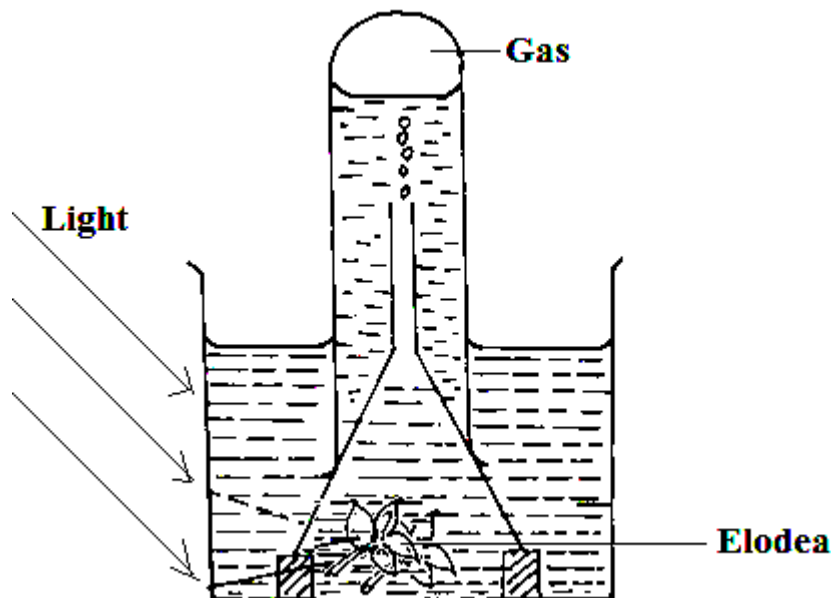
- (a) Identify the bone ( 1mark)
- (b) i) Name the bones that articulate with this bone at points K and L ( 2 marks)
- K
- L

99. The equation below represents a metabolic process that occurs in the mammalian liver.



Name the process (1 mark)

100. The diagram below represents a set up that was used to investigate a certain process in a plant.



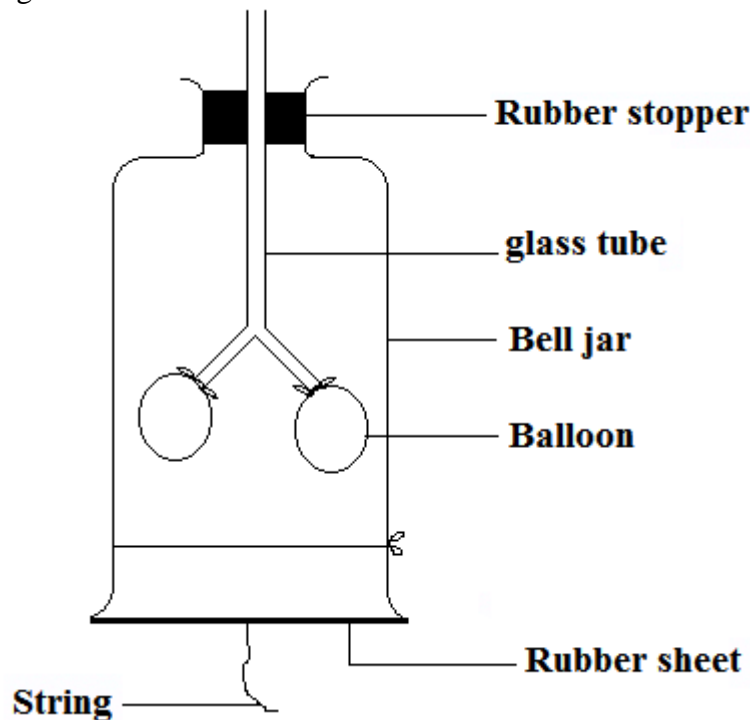
- (a) State the process that was being investigated. (1 mark)
- (b) Other than the factors shown, state two factors that would affect the process named in (a) above. ( 2 marks)
101. Give an example of the sex linked trait in humans located on
- Y – Chromosomes (1mark)
- X – Chromosomes (1 mark)

102. Outline two roles of active transport in human beings. (2 marks)

103. a).Name the causative organism for amoebic dysentery. (1 mark)

b) State three preventive measures of schistosomiasis in human beings (3 marks)

104. Tom, a form two student set up the apparatus shown below to demonstrate the breathing mechanism in a mammal.



(a) What structure in a mammal is represented by each of the following? (2marks)

i) Glass tube.....

ii) Rubber sheet .....

(b) Explain what will happen to the balloons if the rubber is pulled down wards.

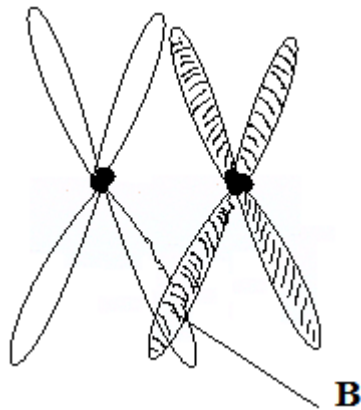
(2 marks)

105.a) What is adaptive radiation? (2marks)

b) Explain why crossbreeding is important in animal breeding. (2 marks)

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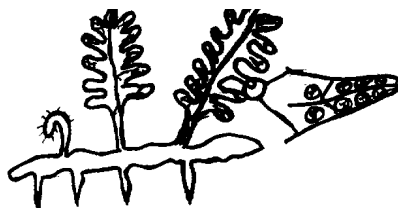
106.The diagram below shows a phenomenon which occurs during cell division.



- 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)
- 107.a) State **one** advantage of double circulation over single circulation. (1 mark)
- b) State **two** adaptations of blood capillaries to their functions. (2marks)
- 108.a) Name a growth hormone that has inhibitory effects in plants growth. (1 mark)
- b) State two characteristics of meristematic cells. (2marks)
109. Write down two functions of exoskeleton. (2 marks)



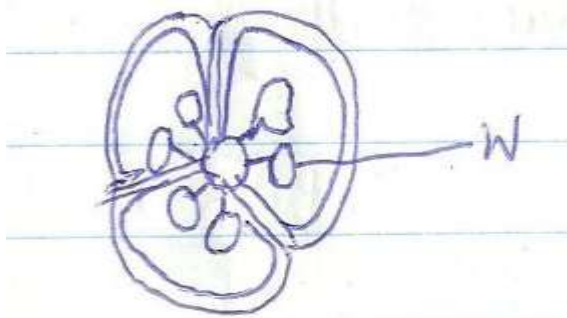
110. Name the branch of Biology that involves the study of: (2marks)
- a) Organisms for the sake of classifying them.
- b) Microscopic organisms.
111. The diagram below represents a plant



- a) Name the division to which the plant belongs. (1mark)
- b) Give **three** reasons for your answer in (a) above. (3marks)
112. State **three** parameters that can be used to estimate growth in seedlings. (3marks)
113. Equal amounts of crushed Irish potato were placed in equal volumes of hydrogen peroxide solution at indicated pH. The volume of the gas produced was measured and recorded as shown in the table below.

pH	4.0	7.0	9.0
Volume of gas (cm <sup>3</sup> )	2.7	5.7	7.7

- (a) Name the gas that was produced. (1mark)
- (b) Account for the difference in the volume of the gas produced in pH 4.0 and pH 9.0 (2marks)
114. The diagram below represents a transverse section of an ovary from a certain flower.



- (i) Name the structure labeled W. (1mk)
- (i) Name the type of placentation illustrated in this diagram. (1mk)
115. What are the names of modified leaves enclosing bougainvillea flowers whose function is to attract insect pollinators? (1mark)
116. (a) A dog weighing 15.2kg requires 216kJ while a mouse weighing 50g requires 2736 kJ per day. Explain. (2marks)

(b) Under what condition is lactic acid formed in human muscles? **(1mark)**

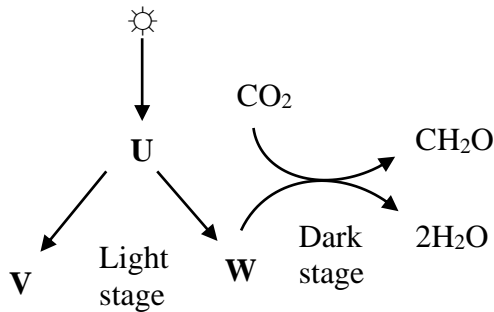
117. In a certain experiment, the following observation was made:

When red blood cell was placed in a certain solution, the solution exerted more osmotic pressure leading to the cell losing water molecules to become crenated/ shrunk.

(a) What type of solution was the cell placed in respect to the cell's cytoplasm? **(1 mark)**

(b) By which physiological process did the cell lose water molecules? **(1 mark)**

118. Study the flow diagram below.



Name the substance U, V and W. **(3 marks)**

119. a) State the deficiency diseases of each of the following vitamins. **(3 marks)**

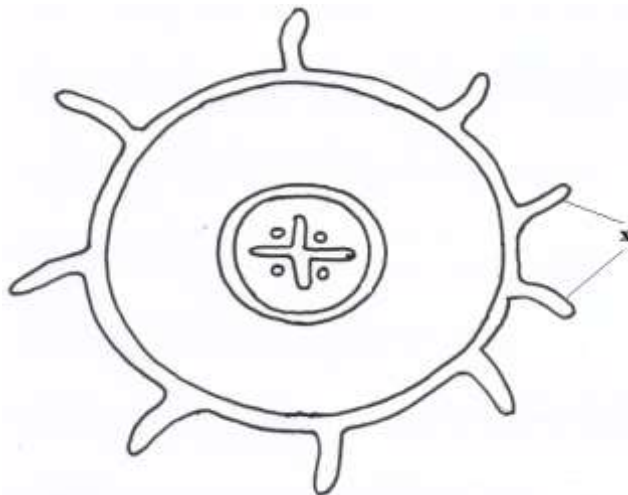
(i) B<sub>1</sub> .....

(ii) B<sub>2</sub> .....

(iii) B<sub>6</sub> .....

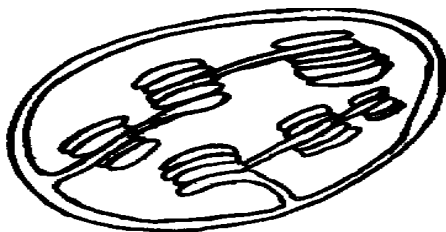
(b) What is the role of roughage in a diet? **(1 mark)**

120. The diagram below represents a transverse section of a plant part. Study it and answer the questions that follow.



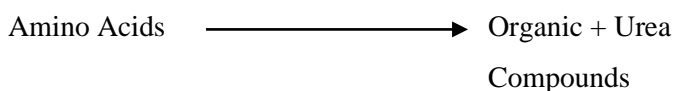
- a) Name the class in which the plant belongs. (1mark)
- b) Give a reason for answer (a) above (1mark)
- c) State one adaptation for the structures labeled X to their functions. (1mark)

121. Below is a diagram of an organelle.



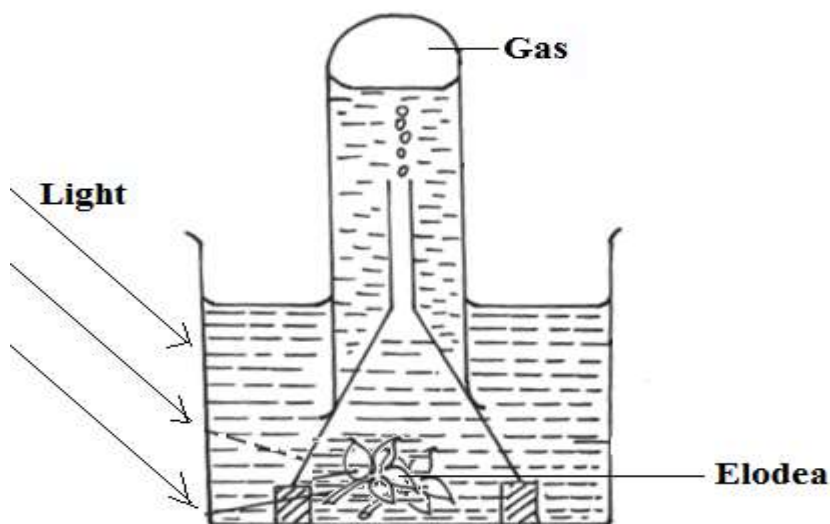
- (a) State the function of the organelle drawn above. (1mark)
- (b) Name the parts of the organelle where :
- (i) Oxygen gas is produced as a byproduct. (1mark)
- (ii) Carbon (IV) oxide is utilized. (1mark)

122. The equation below represents a metabolic process that occurs in the mammalian liver.



- (a) Name the process (1 mark)
- (b) What is the importance of the process to the mammal? (2marks)

123. The diagram below represents a set up that was used to investigate a certain process in a plant.

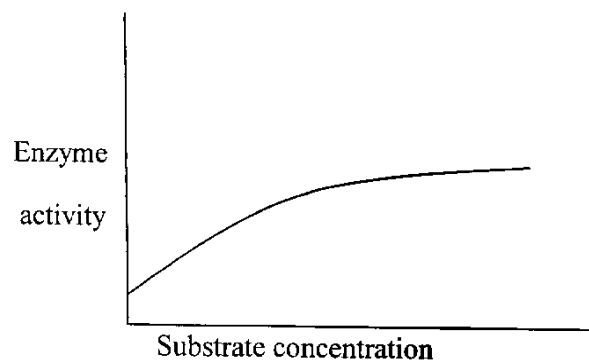


- (a) State the process that was being investigated. (1 mark)
- (b) Other than the factors shown, state two factors that would affect the process named in (a) above. (2 marks)

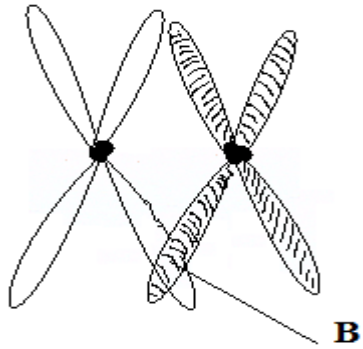
124. a) Name the causal organism for amoebic dysentery. (1 mark)
- b) State three preventive measures of schistosomiasis in human beings (3 marks)

125. (a) Why is the wall of the left ventricle thicker than that of the right ventricle. (1mark)  
(b) State **three** adaptations of xylem to water transportation (3marks)

126. Use the graph below to answer the following questions.



- (a) Why does the activity of the enzyme become constant after a while? (1mark)  
(b) State how the activity of the enzyme may be increased in (a) above. (1mark)
127. Describe capture - recapture method of estimating population. (3marks)
128. What is meant by self sterility with reference to flowers? (1mark)
129. Why do plants lack complex excretory system? (3marks)
130. State **three** advantages of asexual reproduction in plants. (3 marks)
131. How does sunken stomata help in lowering transpiration? (3marks)
132. State the importance of active transport in living organisms. (3marks)
133. Why does carboxyhaemoglobin lead to death? (2marks)
134. Name **two** gaseous exchange sites in higher plants. (2marks)
135. What causes apical dominance? (1mark)
- 136a) What type of circulatory system is found in members of class insecta? (1 mark)
- b) Name the blood vessel that transports blood from:
- (i) Small intestine to liver. (1 mark)
- (ii) Lungs to heart (1 mark)
137. Distinguish between natural and acquired immunity. (2 marks)
138. 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)**

**139.** State **two** functions of ovaries in humans. **(2marks)**

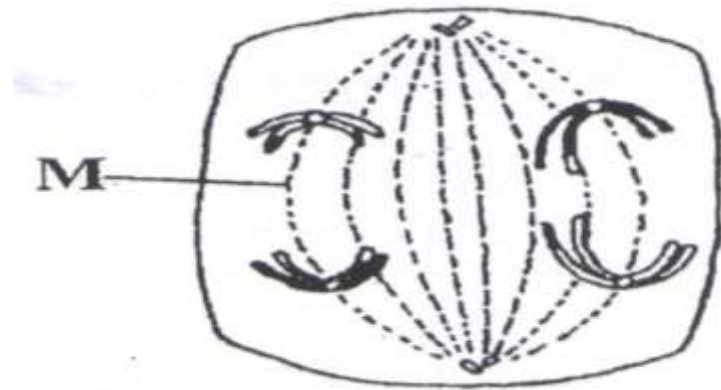
140. Name the part of a flower that develops into:

[i] Seed [1mk]

[ii] Fruit [1mk]

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

142. 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]

[b] Name the class to which millipede belongs [1mk]

143[a] Distinguish between the terms [2mk]

Homodont and heterodont

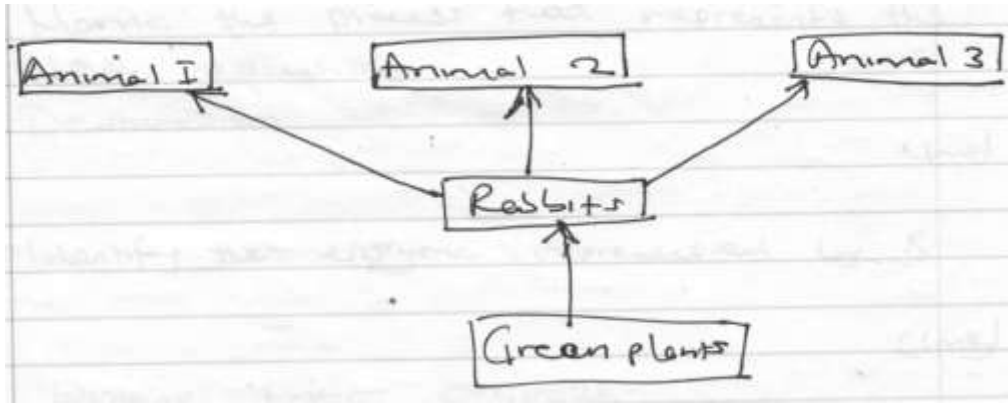
[b] what is the function of the carnassial teeth [2mk]

144. 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]

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



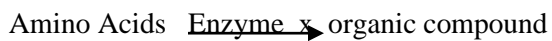
[a][i] Name the food relationship shown [1mk]

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

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

146. Name the only epidermal cell in plants that contain chloroplast [1mk]

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



[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]

148. [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]

149.[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 a natural system of classification [2mk]

150. 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]

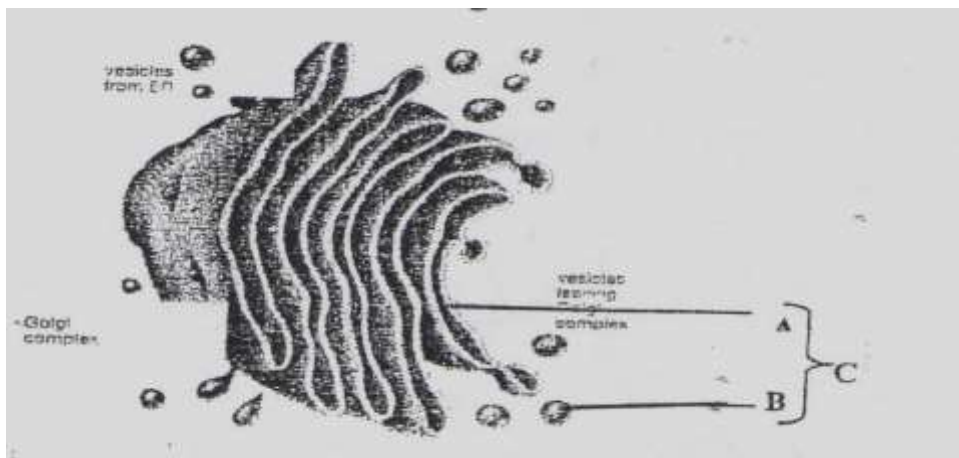
[ii]Name the cell organelle most abundant in phagocytes to enable them function effectively [1mk]

151. Name the:

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

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

152. The diagram below represents a cell organelle.



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

[ii]Name each of the parts A and B

A [1mk]

B [1mk]



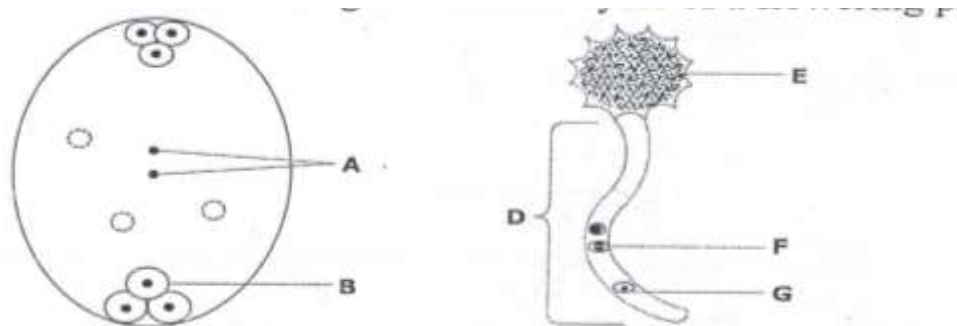
153. In which two ways do guard cells differ from other epidermal cells [2mk]

154. 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 [1mk]

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

156. 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	

[1mk]

157 [a]. State 2 characteristics of kingdom Monera that are not found in other kingdoms [2mk]

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

159. State three physiological processes that are involved in movements of substances across the cell membrane [3mk]

160. If the human pancreas is not functional:

[a] Name the hormone which will be deficient [1mk]

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

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



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

[b]Identify the food substrate [1mk]

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



[a]Identify the apparatus [1mk]

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

163. State two factors in an ecosystem that affect the distribution of organisms [2mks]

164. A DNA strand has the following base sequence G C C T A G A T C A C

What is the sequence of the

[i] Complementary DNA strand [1mk]

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

165. State three limitations of fossil records as evidence of organic evolution [3mk]

166. How does nutrition as a characteristic of living organism differ in plants and animals [2mk]

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

[ i] Body tube [1mk]

[ii] Diaphragm [1mk]

168. State three characteristics of gaseous exchange surfaces [3mk]

169. State two sources of variations [2mk]

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



(a) Identify the parasite transmitted into human blood by the organism. (1 mark)

(b) Name the blood cells that are destroyed by the parasite in (a) above. (1 mark)

(c) State one biological method used to eradicate the larvae of this organism. (1 mark)

171. Give the structural adaptations of the following in an insect pollinated plant.

(a) Pollen grain. (1 mark)

(b) Stigma. (1 mark)

172. State the causative agents of the following diseases

(i) Tuberculosis. (1 mark)

(ii) syphilis (1 mark)

173.a) What do you understand by the term ecologically balanced ecosystem? (1mk)

b) Give two reasons for loss of energy from one trophic level to another in a food web (2mks)

174. Identify the following types of responses:

(a) Pollen tube growing towards the ovary (1 mark)

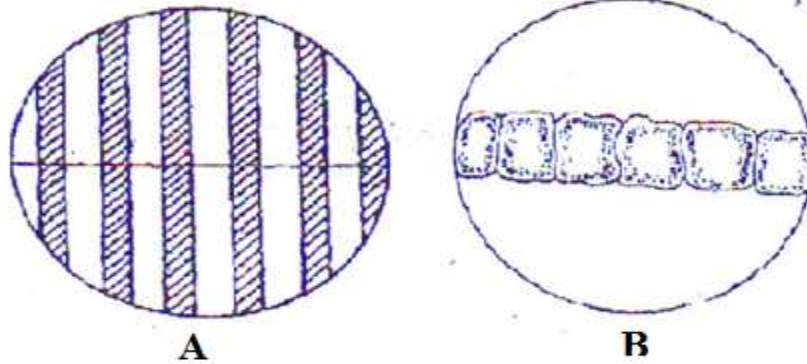
(b) Maggots moving away from light. (1 mark)

175. State two activities of the cell that are controlled by the nucleus. (2 marks)

176. Distinguish between botany and zoology. (1 mark)

177. 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.

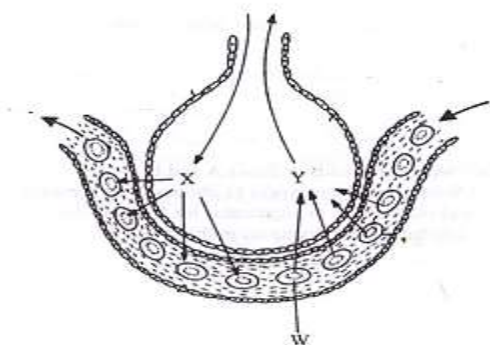


- Calculate the length of one cell. (2 marks)
- 178. State two importance of water in germination of seeds. (2 marks)
- 179. Why is sexual reproduction advantageous in flowering in plants? (2 marks)
- 180. Below is an illustration of an organism captured by students during a practical lesson.



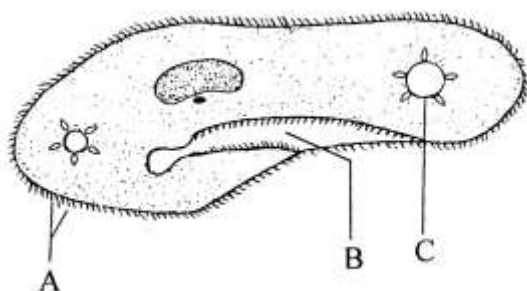
- (a) Identify two features that enable the organism to be placed in the phylum Arthropoda. (2 marks)
- (b) Explain why the organism will die when Vaseline is applied on its thorax. (1 mark)
- 181. Name two properties of enzyme amylase. (2 marks)
- 182. State the significance of natural selection. (2 marks)
- 183. Explain why a plant shoot develops lateral branches when its tip is removed. (2 marks)
- 184. Why is eating a lot of biscuits harmful to the teeth. (2 marks)
- 185. a) Name the part of the chloroplast where each of the following activities take place.
  - i) Light stage.....(1mk)
  - ii) Dark stage.....(1mk)
- b) Name two types of cells in a leaf that carry out photosynthesis (2mks)
- 186. State any three disorders due to Gene mutation in human beings (3 marks)

187. Why is it important that the radicle develops first during germination? (2 marks)
188. (a) Explain one event of mitosis that restores the genetic constitution of an organism. (1 mark)
- (b) Identify the following types of cell division:
- (i) Division of generative nucleus into male nuclei. (1 mark)
- (ii) Division of cells lining the seminiferous tubules. (1 mark)
189. State two observable characteristics that show discontinuous variations in *Drosophila melanogaster* (2 marks)
190. Explain why athletes breathe quickly and deeply after a 100 meters sprint. (2 marks)
- 191.(a) State two proteins that determine human blood groups. (1 mark)
- (b)(i) What is the role of blood capillary? (1 mark)
- (ii) Explain why blood does not clot in undamaged blood vessels. (1 mark)
- 192.(a) List one type of chromosomal aberrations. (1 mark)
- (a) State one advantage of polyploidy in modern farming. (1mark)
193. Explain:
- (a) Why insulin is not administered orally. (1 mark)
- (b) Why stomach wall is lined with mucus (1 mark)
- 194.(a) what is homeostasis? (1 mark)
- (b) State two behavioral mechanisms used by snakes to increase their body temperature. (2 marks)
195. Explain why only a small amount of food materials taken up by herbivores is passed on to secondary consumers. (2 marks)
196. 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)
197. (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)

198. Study the diagram below and answer the question that follows:



- (a) Name the kingdom from which the organism belongs to. (1 mark)
- (b) State the function of the structure labelled C. (1 mark)
199. State two characteristics of a bony fish which enable it to reduce friction in water. (2 marks)
200. (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)
201. Name two characteristics that are controlled by the gene located on:
- i) Y chromosomes (2mks)
- ii) X chromosomes (2mks)
202. (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)

203. Name three sites of gaseous exchange in frogs. (3mks)
- 204.a) What is organic evolution (1mk)
- b) Distinguish between divergent and convergent evolution giving example in each case. (4mk)
205. State three applications of plant hormones in agriculture (3 marks)
- 206 (a) Give an equation to show that respiration involves oxidation of glucose (1mk)
- (b) How is an energy rich molecule rebuilt after muscle contraction (2mks)
- (c) apart from energy, name another end product of anaerobic respiration in animals (1mks)
- 207 Give the functions of the following ecological instruments (2mks)
- (a) Seechi disc
- (b) Photographic light meter
- 208.a) Which genetic disorder is caused by lack of a gene which causes production of Melanin. (1mk)
209. List down **two** phenotypic characteristics that have been selected for the production of strains suitable for modern agricultural purposes (2mks)
210. A plant was observed to have parallel venation and fibrous root system. Name.
- (i) Subdivision of this plant. (1 mk)
- (ii) Class to which the plant belongs. (1 mk)
211. Name the organism that;
- (a) (i) causes malaria (1 mark)
- (ii) Transmits malaria (1 mark)
- (b) State two control measures for malaria (2 marks)
212. Explain two milestones in the evolution of man that have made him the most dominant species on earth. (2marks)
213. 50 black mice and 50 white mice were released into an area inhabited by a pair of owls. After four months 38 of the black mice and 9 of the white mice were recaptured.
- a) How this observation would be explained. (2 marks)
- b) Name the theory of evolution that support the results in (a) above. (1mark)
- c) Name one vestigial structures in man. (1 marks)
214. State the functions of the following apparatus.
- (i) Bait trap (1mk)
- (ii) Pooter (1mk)
- 215.a) Define the term 'parthenocarpy'. (1mk)

- (b) Name **two** plant growth hormones that promote parthenocarpy. (2mks)
216. What is the biological importance of the larval stage during metamorphosis (2mks)
- 217.a) State **one** structural and one functional difference between motor and sensory neurone. (2mks)
- Structural
- Functional
- b) What name is given to the gap between the sensory neurone and intermediate neurones. (1mk)
- (c) Name the transmitter substance found in the gap named in (b) above. (1mk)
218. Name the type of response shown by: (2mks)
- a) Sperms when they swim towards ovum.
- (b) Euglena when they swim towards the source of light.
219. Give **two** reasons why the pressure of blood is greater in the arteries than in the veins in mammals. (2 marks)
- 220.a) What is the importance of heartbeat in blood circulation? (1mk)
- b) If the nerve supply to the heart of a mammal is severed, the rhythmic heart movement will still go on and the heart continues to beat. Explain this observation. (1mk)
221. What happens when respiration exceeds photosynthesis in the guard cells of terrestrial plants? (3 mks)
- 222.a) Name the hard body covering found in organisms of the phylum arthropoda. (1mk)
- b) Give **two** uses of the structure mentioned in (a) above. (2mks)
223. Describe how the following conditions promotes cross pollination
- (i) heterostyly (1 mark)
- (ii) self sterility (1 mark)
224. Distinguish between plasmolysis and deplasmolysis as used in cell physiology (3 marks)
225. Explain how surface area to volume ratio affect the rate of diffusion in living organisms (2 marks)
226. State two differences between the product of mitotic division and those meiotic division (2 marks)

mitosis	meiosis

227. Explain why fresh water aquatic animals excrete nitrogenous waste in form of ammonia (3 marks)
228. Alongside alimentary canal are enzymes that digest food into simpler absorbable forms. study the illustration below to answer questions that follows





(a) Identify enzyme K and its site of action in alimentary canal (2 marks)

Enzyme	Site of action

(b) Identify enzyme L and state its pH under which it works best (2 marks)

Enzyme	pH

229.(a) What makes young herbaceous plants remain upright (2 marks)

(b) Why should herbaceous plant remain upright (2marks)

230.(a) Name the main excretory product stored in the coffee berries (1mk)

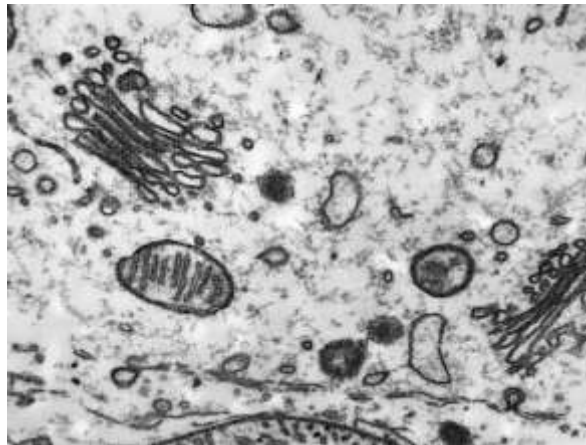
b) What is the economic use of the products named in a (a) above (1 mark)

231.(a) state one advantages of asexual reproduction (1mk)

232.Define the term photolysis (1 marks)

233.Outline one functions of the femur bone (2 marks)

234. The photomicrograph shown below is a section of a cell



- a) Using the letters provided, label the organelle that: (2mks)
- i) Is found in high number in kidney cells (**KC**)
  - ii) Is abundant in secretory glands (**SG**)
- b) State the importance of cytoplasmic streaming to a cell (1mk)

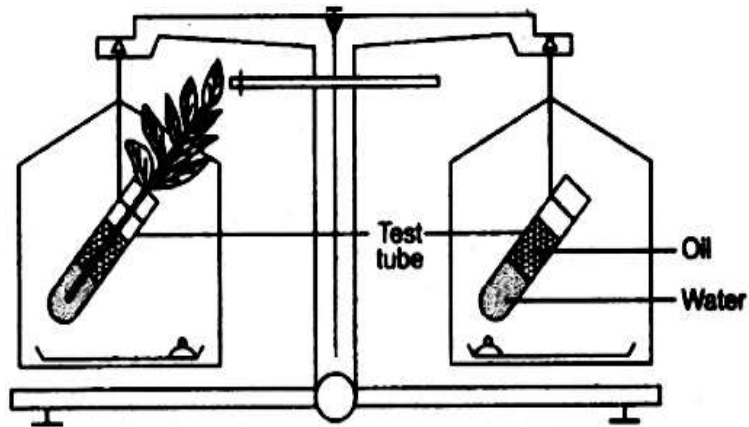
235. An athlete experienced a muscle cramp after a sprint race

- a) Name the acid that accumulated in her muscles to bring about the discomfort (1mk)
- b) Describe the fate of this acid when the athlete takes a rest (2mks)

236. State the functions of the following cells (3mks)

- i) Sertoli cells
- ii) Interstitial cells
- iii) Guard cells

237. The experimental set up shown below was placed in the sunshine for 2 hours to study a particular phenomenon in plants



- a) What is the expected result after the 2hours of experiment? (1mk)
- b) Account for the answer given in a) above (2mks)
- c) What is the expected result if the experiment was done under high humidity? (1mk)

.....

238.Name (2mks)

- a) A cell in the human body that lacks mitochondria

.....

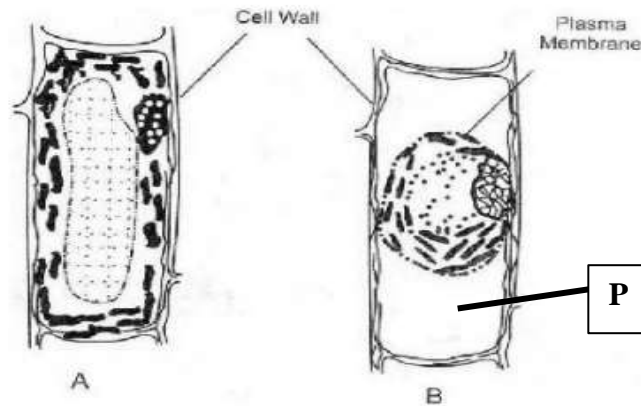
- b) A Kingdom whose members lack mitochondria

.....

239.Fill the table below to show differences between guttation and transpiration (2mks)

Guttation	Transpiration

240.A plant cell was placed in solution **X** and after a while it appeared as cell **B** shown below



- a) Which **TWO** features show that cell **B** is plasmolysed? (2mks)
- b) Which process facilitated the presence of solution **X** in part **P**? (1mk)
- .....
- c) What is the nature of solution **X**? (1mk)

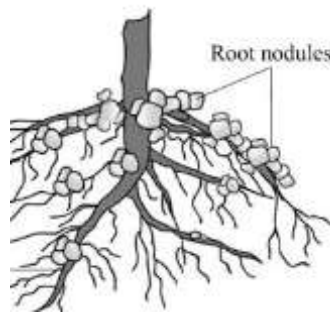
241. Name the tissue that forms the following hormones (2mks)

- a) Glucagon .....
- b) Progesterone .....

242. Learners suspected that a liquid they found in the laboratory contained starch

- a) Describe a procedure they will use to determine whether starch was present (2mks)
- b) State the expected colour change for them to conclude that starch was present (1mk)
- c) What is the advantage of plants storing carbohydrates as starch? (1mk)

243. The diagram below shows the root of a leguminous plant



- a) Name the bacterium found in the root nodules (1mk)
- b) How are the bacteria named in a) important to the legume? (1mk)

244. The following data was collected from study of same crop grown in different temperature

Plot ID	Temperature(°C)	Yield (kg)
A	19	115
B	22	146
C	27	132
D	30	94

- a) Which is the ideal temperature for the growth of this crop? (1mk)  
b) Account for the yield obtained in plot D (2mks)

245. Explain the ways by which movement of the ovum is achieved along the oviduct. (2mks)

- 246.a) Name the salivary gland found beneath the tongue (1mk)  
b) Outline **TWO** ways in which saliva is suited to its function (2mks)

247. The picture below shows a disorder that affects blood vessels in humans



- a) Name the disorder shown above (1mk)  
b) Which blood vessel is affected by this disorder? (1mk)

248. A tall garden pea plant was crossed with a dwarf garden pea plant.

- a) Given that the allele 'd' for dwarfness is recessive, write the genotype of the offspring if the tall garden pea used was: (2mks)

i) Pure bre

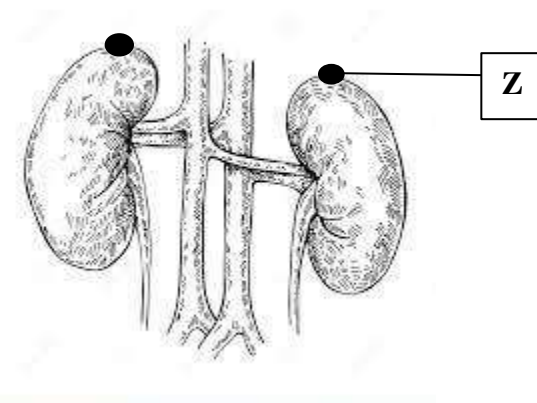
ii) Heterozygous

b) Write the base sequence of the DNA from which the messenger-RNA shown below

was derived. **ACUGAACCGUAU**

(1mk)

249. Use the illustration shown below to answer the questions that follow



a) Why is the right kidney slightly pushed higher up compared to the left kidney? (1mk)

b) Explain how gland labelled **Z** help raise amount of Sodium ions (Na<sup>+</sup>) in the blood

250. The illustration shown below is of a common organism



a) Why is the above organism medically important globally? (2mks)

b) Name the class to which the organism belongs. (1mk)

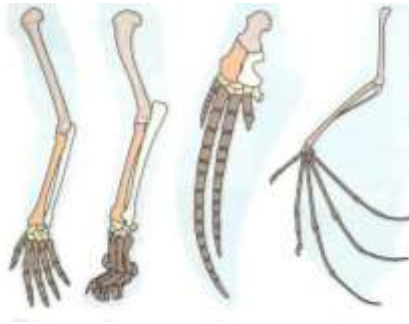
c) Give **TWO** reasons for your answer in b) above (2mks)

251. How are the following significant to the development of seeds

a) Seed dormancy (2mks)

b) Seed dispersal (2mks)

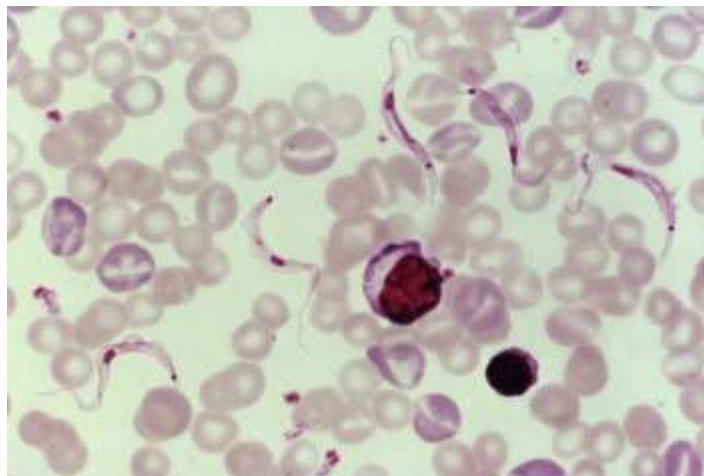
252. Use the images shown below to answer questions that follow



- a) Why are the structures above said to be homologous structures? (1mk)
- b) Which type of evolution is represented above? (1mk)
- c) What is the significance of the type of evolution named in b) to animals? (1mk)

253. A protein has 100 amino acids. Calculate the number of nitrogenous bases in the gene for this protein (2mks)

254. Study the photomicrograph shown below and answer the questions that follow



100µm

- a) Name the parasite shown in the photo above (1mk)  
.....
- b) Which organism is the vector of the parasite? (1mk)  
.....
- c) Calculate the magnification used to obtain the image shown above (3mks)

255. a) Name the chemical form in which the following are transported in the blood (2mks)

- i) Carbohydrates

.....  
ii) Carbon (IV) Oxide  
.....

b) Explain why transfusion of blood from a blood group **B** donor to a recipient with blood group **A** may be fatal. (2mks)

256. Use the photograph shown below to answer questions that follow



a) Explain the role of prothoracic gland during this phase of metamorphosis (2mks)

b) State the significance of this process to the life of the insect (1mk)

257. An animal has 6 molars, 2 canines, 4 incisors and 6 premolars in the lower jaw while the upper jaw has 6 molars, 4 premolars, 0 incisors and 2 canines in the upper jaw

a) What is the significance of absence of incisors in the upper jaw to the feeding of the animal (2mks)

b) Write the correct dental formula for the animal (1mk)

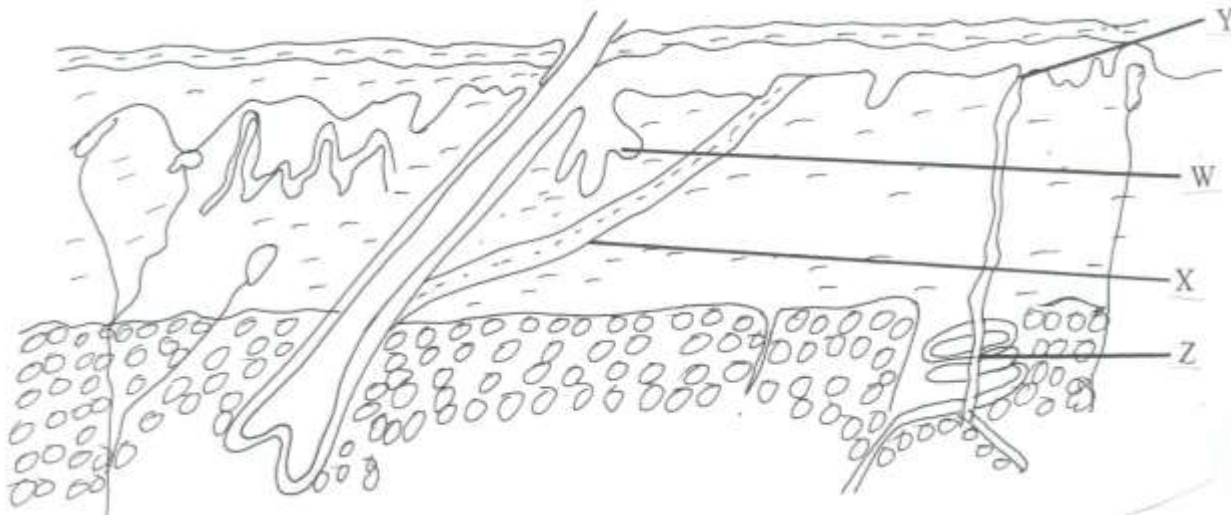
c) Why do such animals have a longer alimentary canal? (2mks)

258. Describe double fertilization in flowering plants (4mks)



**SECTION B (231/2 BIOLOGY PAPER 2)**  
**{QUESTIONS 259-386}**

259. The diagram below shows a section through the mammalian skin



(a) Name the parts labelled W and X (2mks)

W.....

X .....

(b) State the function of the parts labelled Y and Z (2mks)

(c) Explain the changes that occur in the skin when it is cold (4mks)

260.(a) Eye colour in fruit flies is sex-linked. Red eye colour **R** is dominant to white eye colour **r**  
 A heterozygous red-eyed female fly was crossed with a white-eyed male

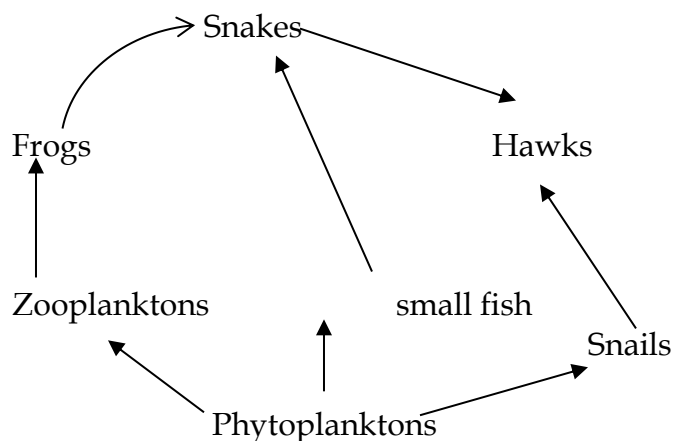
(i) Show the parental genotypes (1mk)

(ii) By means of a genetic cross, determine the genotypic ratio of the offspring (4mks)

(iii) Explain why the actual phenotypic ratio obtained from this cross could differ from the expected (1mk)

(b) Name two disorders due to non-disjunction (2mks)

261. The diagram below represents a feeding relationship in an ecosystem.



(a) Name the type of ecosystem represented by the above food web (1mk)

(b) Name the organism in the food web that

(i) Is a producer (1mk)

(ii) Occupies the highest tropic level. (1mk)

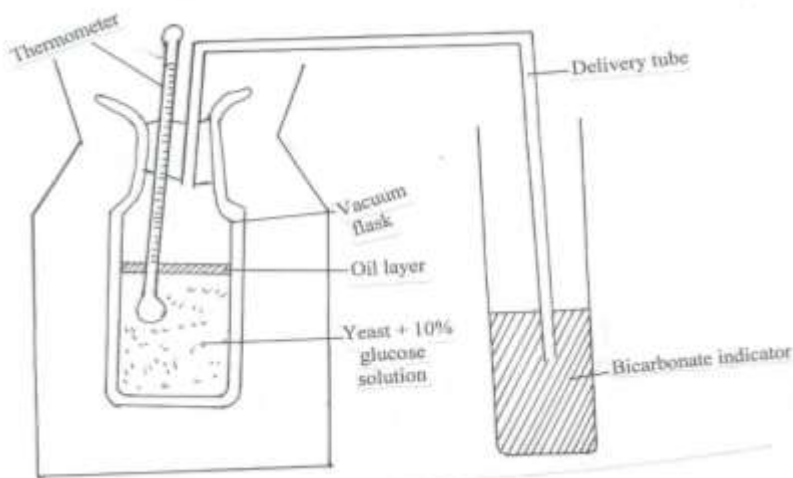
(c) (i) Write a food chain that ends with the hawk as a quarternary consumer. (1mk)

(ii) State two short terms effects on the above ecosystem if all the small fish were killed (2mks)

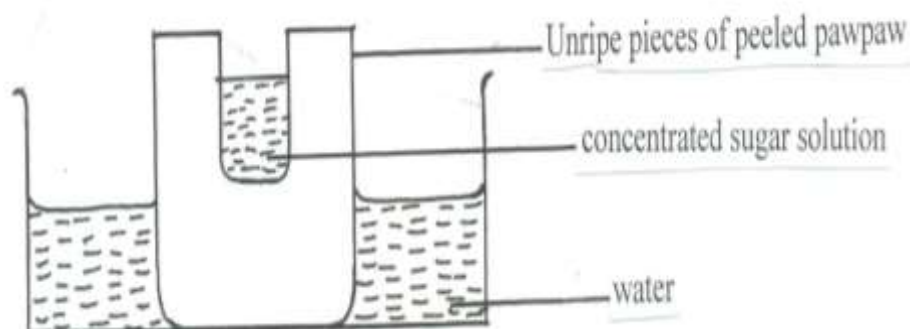
(d) (i) How does oil spills lead to death of fish? (1mk)

(ii) Name one other cause of water pollution apart from oil spills. (1mk)

262. 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 24 hours



- (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 (2mks)
- (iii) Why was glucose solution boiled then cooled? (1mk)
- (c) Suggest a control for the above experiment. (1mk)
263. A group of students set up an experiment to investigate a certain physiological process. The set up was as shown in the diagram below.



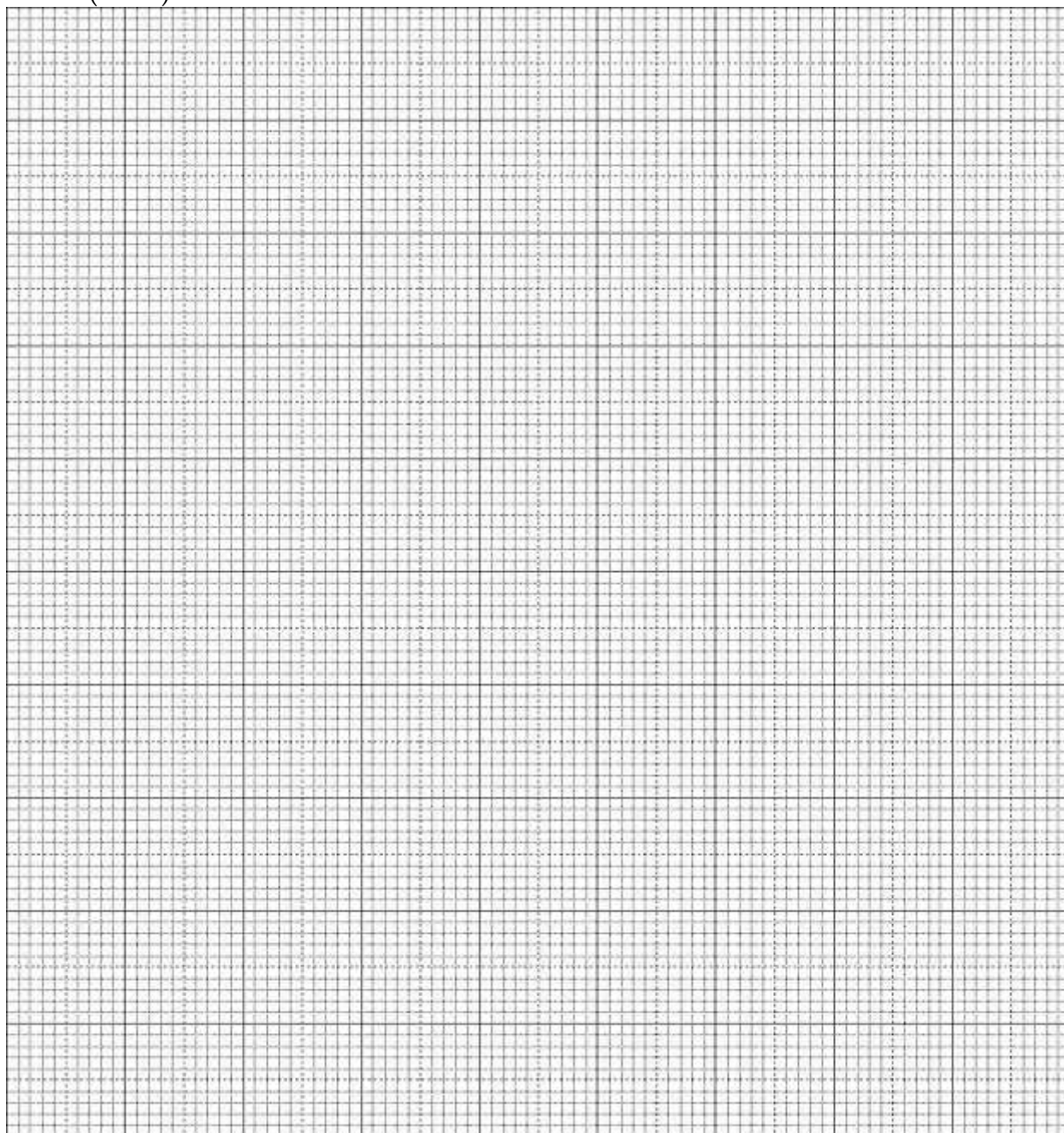
After some time, the students observed that the level of sugar solution had risen

- (a) What physiological process was being investigated. (1mk)
- (b) Account for the rise in the level of sugar solution in this experiment. (4mks)
- (c) (i) State the results that the students would obtain if they repeated the experiment using a piece of boiled pawpaw. (1mk)
- (ii) Give a reason for your answer (2mks)
264. During germination and growth of a cereal, the dry weight of endosperm, the embryo and the total dry weight were determined at two day intervals. The results are shown in the table below:

- a) Using the same axes, draw graphs of dry weight of endosperm, embryo and the total dry weight against time.

Time after planting (days)	Dry weight of endosperm (mg)	Dry weight of embryo (mg)	Total dry weight (mg)
0	43	2	45
2	40	2	42
4	33	7	40
6	20	17	37
8	10	25	35
10	6	33	39

(7mks)



- b) What was the total dry weight on day 5 (1mark)
- c) Account for
  - i. Decrease in dry weight of endosperm from 0 to 10 (2mks)
  - ii. Increase in dry weight of embryo from day 0 to day 10 (2mks)
  - iii. Decrease in total dry weight from day 0 to day 8 (1mk)

- 
- iv. Increase in total dry weight after day 8 (1mk)
- d) State two factors within the seed and two outside the seed that cause dormancy
- i. Within the seed. (2mks)
- ii. Outside the seed (2marks)
- e) Give two characteristics of meristematic cells (2mks)
265. (a) Describe the process of fertilization in flowering plants (15mks)  
(b) State the changes that take place in a flower after fertilization (5mks)
266. (a) Describe the mechanism of inhalation in man. (10mks)  
(b) Using photosynthesis theory explain the mechanics of opening of stomata. (10mks)

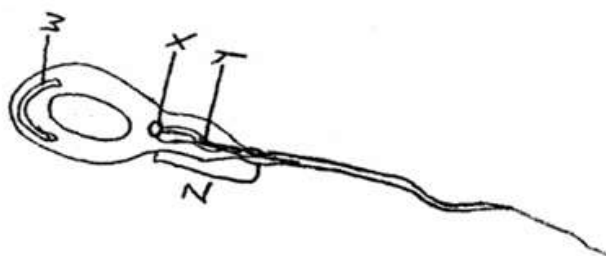


267. An investigation was carried out to study the effects of the concentration of sucrose solutions on pieces of tulip stem 44mm in length. The pieces were placed in different concentrations of sucrose solutions and measured after two hours of immersion. The results are shown in the table below.

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).
- 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)
  - 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)

268. Below is a diagram of a sperm cell.



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

W  
Z

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

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

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

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

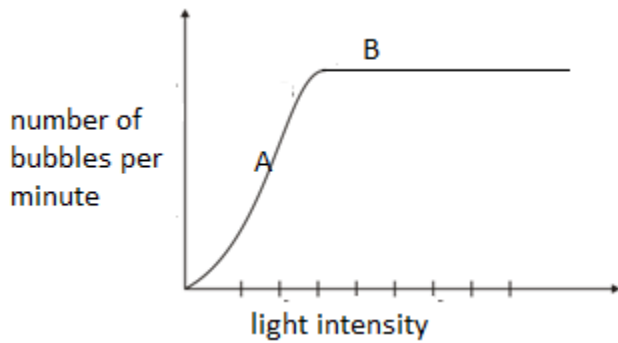
- b) The table below shows results of marriages between various parents. Complete the table by writing the probability of each marriage producing a child with polydactyl. One has been done for you. (2mks)

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

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

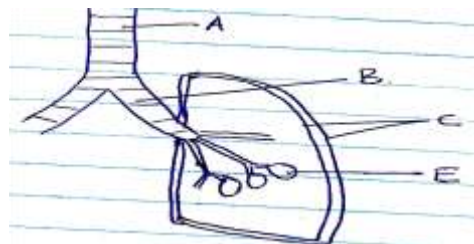
270. Cuban pond weed (*Elodea cubiensis*) is a common water plant that produces tiny air bubbles of oxygen during photosynthesis. The number of bubbles produced per minute indicates the rate of photosynthesis. The graph shows how the rate of photosynthesis in the pond weed relates to light intensity.





- a). write the equation to account for the air bubbles. (1mk)
- b). Name the factor that affects photosynthesis at point A. Explain. (2mks)
- c). Explain why the rate of photosynthesis does not increase any further at high light intensity.(point B) (2mks)
- d). Explain the role of the following in photosynthesis.
- i) Chlorophyll. (1mk)
  - ii) Water. (1mk)
- e). Name one product of the light stage of photosynthesis used in the dark stage of photosynthesis. (1mk)

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



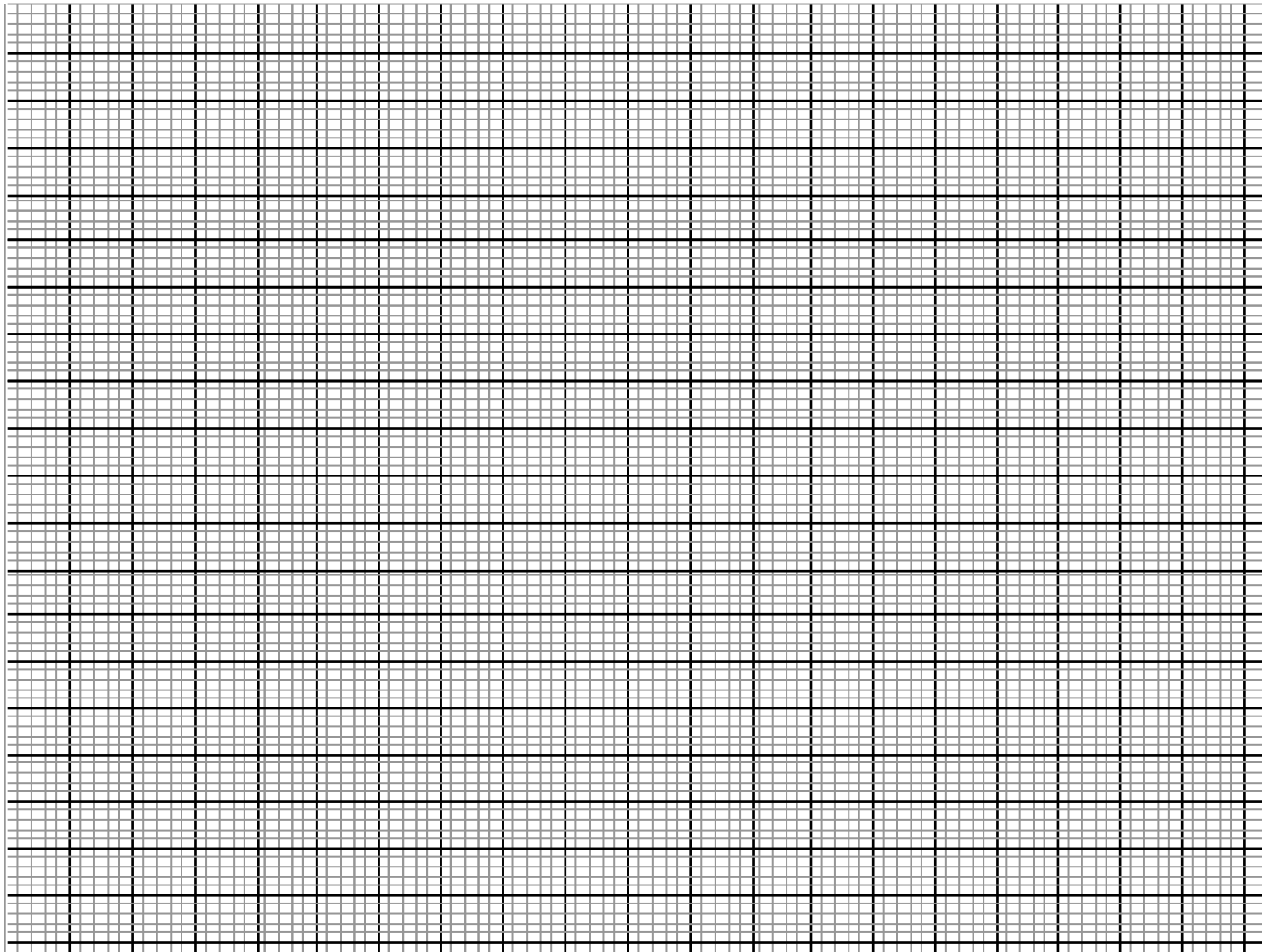
- a) Name the part labeled A and B (2marks)
- b) State the function of the part labeled C (2marks)
- c) How is the part labeled E adapted to its function (2marks)
- d) Identify the structure that perform the same function as one illustrated above in (2marks)
- i) Amoeba

ii) Fish

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

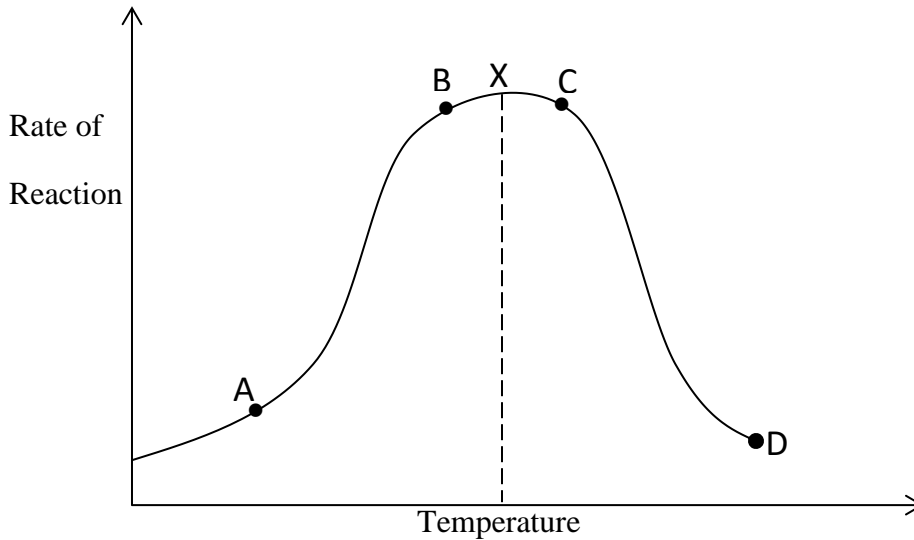
Month	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec
No of insects	10	20	16	24	50	85	45	18	12	30	48	70
No of predator	10	12	8	10	16	30	10	4	2	2	5	20
Rainfall amount(mm)	20	6	55	350	500	250	12	10	25	190	240	30

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



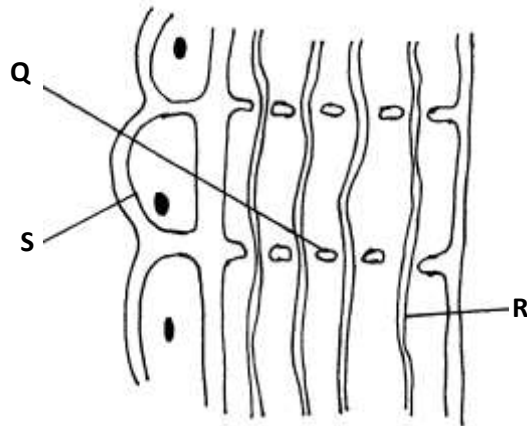
- b) Suggest what happens to the insect's population during dry month. (2mks)
- c) Explain the relationship between the insect population and that of the predators. (3mks)
- d) Suggest what happens to the predator's population during the dry month. (2mks)
- e) Name the trophic level occupied by (3mks)
- i) Predator.
  - ii) Insect.
  - iii) Grass.
- f) Name the method used to estimate population of (3mks)
- i). Predator.
  - ii. Insect.
  - iii. Grass.
273. State and explain various areas where knowledge about genetics is applied. (20mks)
274. a) Describe the process of fertilization in flowering plant. (15mks)
- b) State the changes that take place in a flower after fertilization. (5mks)

275. The graph below shows the effect of temperature on an enzyme catalyzed reaction.



- (a) Account for the shape of the curve between.
  - (i) A and B. (3 marks)
  - (ii) C and D. (2 marks)
- (b) What does the point marked X represent? (1 mark)
- (c) Apart from temperature, state two other factors that affect the rate of enzyme controlled reaction. (2 marks)

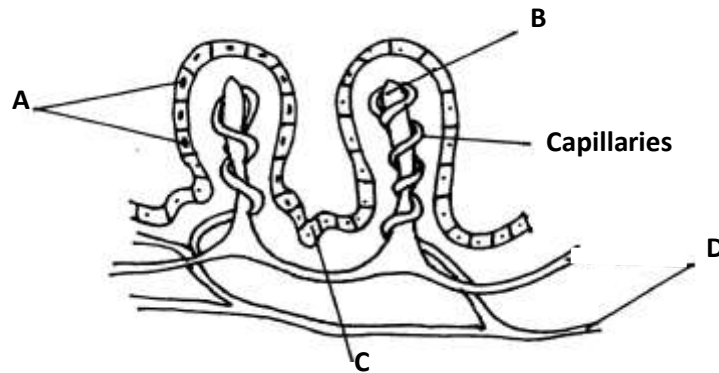
276. The diagram below represents part of plant tissue.



- (a) Identify the tissues. (1 mark)
- (b) Name the structures labeled **Q** and **R** and the cell labelled **S** (3 marks)
  - Q**.....
  - R**.....
  - S**.....
- (c) State the function of the structure labelled **R** (1 mark)
- (d) Explain why xylem is a mechanical tissue. (2 marks)

(e) Supposing the cells marked **S** were treated with Metabolic poison, which physiological process would be affected in the plant tissue (1 mark)

277. The figure below represents a structure obtained from the ileum of a mammal



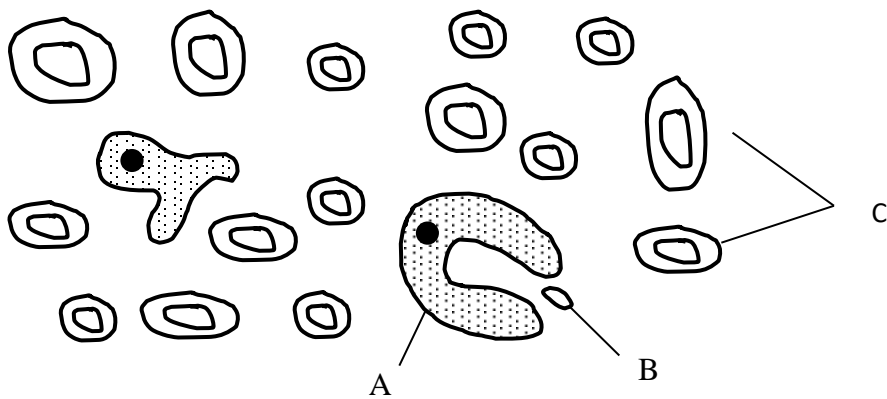
- (a) Give the identity of the structure. (1 mark)
- (b) Name the parts labeled **A** and **B** (2 marks)
- (c) Name **two** enzymes secreted by walls of the structure that bring about digestion (2 marks)
- (d) Briefly explain how fats are transported in structure labeled **B**. (2 marks)
- (f) Explain **one** role of salts secreted by gall bladder in digestion process. (1 mark)

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

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

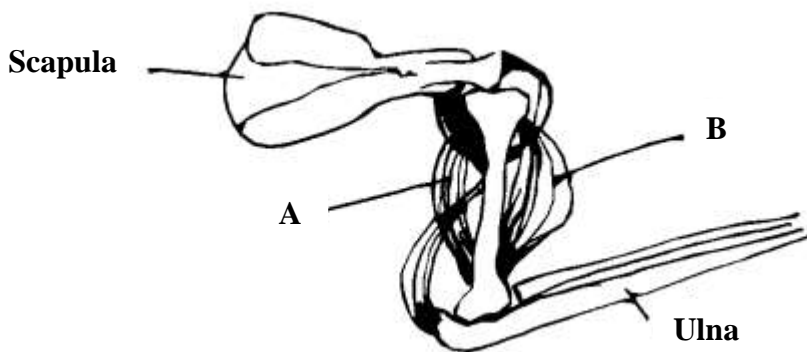
- (a) Calculate the percentage of Rhesus negative (Rh-ve) individuals in the population? (1 mark)
- (b) Account for
  - (i) The large number of blood group O individuals in a population. (2 marks)
  - (ii) The small number of individuals with blood group AB. (2 marks)

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

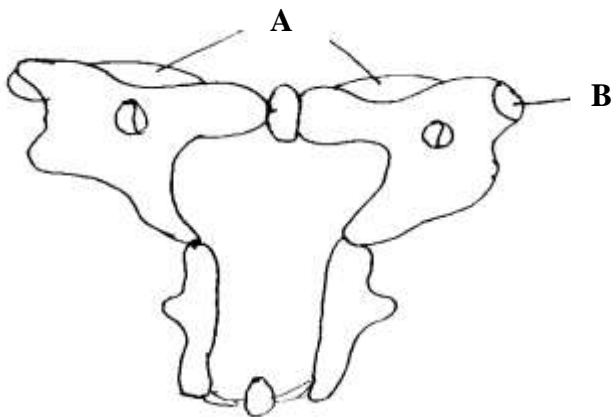


- (i) State the importance of structure C being large numbers in the blood smear. (1 mark)
- (ii) Give a reason why structure C would be found in large numbers in high altitude than in low altitude. (1 mark)
- (iii) Name the process by which structure A would engulf structure B. (1 mark)

279.a) The diagram below represents bones and muscles in human arm



- i) Give **two** differences between the type of muscles labeled A and B above and the type of muscles found in the blood vessel (2mark)
  - ii) Explain how the muscles labeled A and B above bring about stretching of the arm (2marks)
- b) Below is diagram of above coiled sacrum

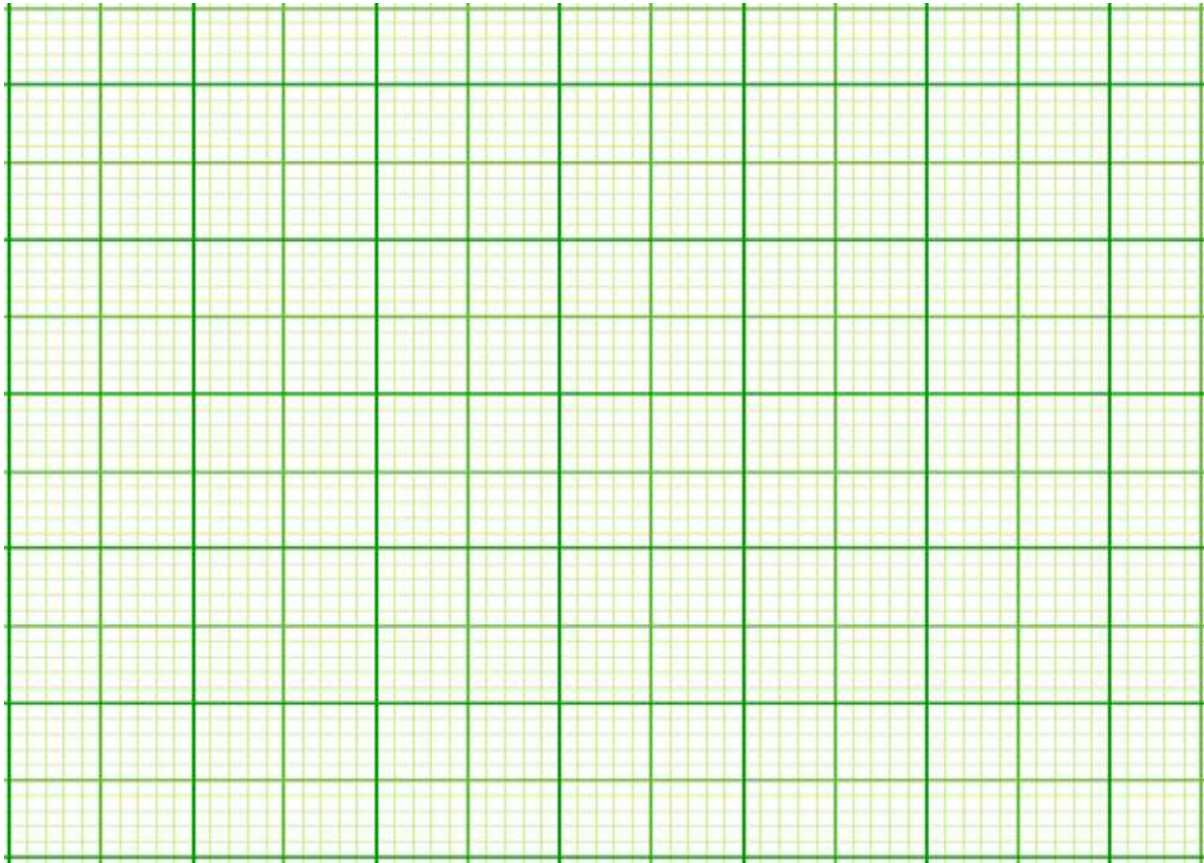


- i) State the disgusting feature of sacrum (1mark)
- ii) What is the function of sacrum in the body (1mark)
- iii) How is sacrum adapted to its function (2marks)

**280.** You have been provided with the data below on the growth of mice population. The population starts with two sexually mature mice, a male and a female. Every time they reproduce they reproduce in litter of six (3 males and 3 females) at 7 weeks intervals. Assume that they take 14 weeks to sexually mature and produce. They only die of old age when they are 3 years old. The following table shows population growth and litter production.

<b>Time interval in weeks</b>	0	7	14	21	28	35	42	49
<b>Mice population</b>	2	8	14	28	62	104	146	260
<b>Litter population</b>	0	6	6	24	24	42	42	114

- (a) Using the same axis draw graphs of population of mice and litter against time. (8 marks)



- (b) (i) How many times has the first litter of mice reproduced. (1 mark)
- (ii) How many times has the third litter of mice reproduced? (1 mark)
- (c) State **four** factors that may have affected the population growth of mice. (4 marks)
- (d) Explain the shape of the litter curve. (4 marks)
- (e) How many pairs of mice reproduced between 14 - 21<sup>st</sup> weeks and 42 - 49 weeks? (2 marks)
- (i) Between 14 – 21<sup>st</sup> weeks.
- (ii) Between 42 – 49 weeks.

**281.** Describe the

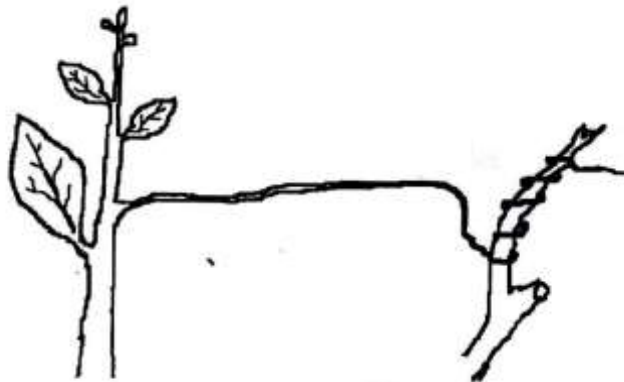
- (i) Process of inhalation in mammals (10 marks)
- (ii) Mechanism of opening and closing of stomata (10 marks)

**282.** Describe the role of hormones in human female menstrual cycle. (20 marks)



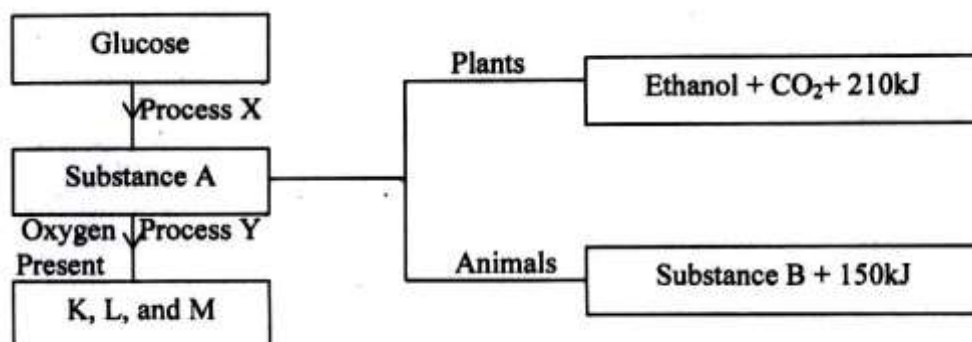
- 283.(a)What is meant by the term sex linkage? (1 mark)  
 (b) Name two sex-linked traits in humans (2 marks)  
 (c) In *Drosophilamelanogaster*, the inheritance of eye colour is sex-linked. The gene for the red eye is dominant. A cross was made between a homozygous red-eyed female and a white eyed male. Work out the phenotypic ratio of F1 generation. (Use R to represent the gene for the red eyes) (5 marks)

284.A response exhibited by a certain plant tendril is illustrated below.



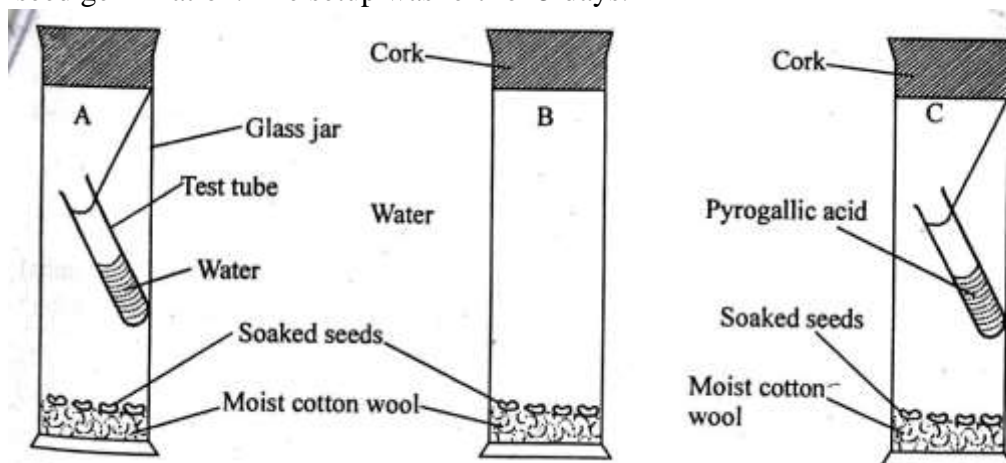
- a) (i) Name the type of response. (1 mark)  
 (ii) Explain how the response named in (a) (i) above occurs. (3 marks)  
 a) What is the importance of tactic response to microscopic plants? (1 mark)  
 b) State **three** applications of plant hormones in Agriculture. (3 marks)

285.The diagram below represents a simple respiratory pathway in cells



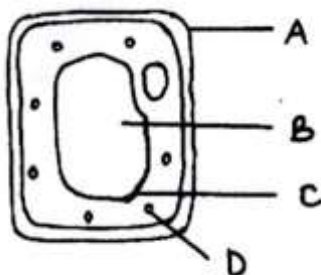
- a) Name the process marked X and Y. (2 marks)  
 b) State **two** differences between process X and Y. (2 marks)  
 c) State the name of substance B and condition under which it is formed. (2 marks)  
 d) Explain how body size affects the rate of respiration in animals. (2 marks)

286. The diagram below represents a setup to investigate the conditions necessary for seed germination. The setup was left for 5 days.



- What conditions were being investigated in the experiment? (2 marks)
- Explain the role of water during seed germination. (3 marks)
- Account for the expected results in each setup after 5 days. (3 marks)

287. Examine the diagram below and use it to answer the questions that follow.



- Name the parts labeled. (3 marks)  
 B.....  
 C.....  
 D.....
- What is the substance that makes up part labeled A? (1 mark)
- Name the process by which mineral salts move into structure B. (1 mark)
- Explain what happens when a red blood cell is put in distilled water. (3 marks)

288. The data below shows the rate of photosynthesis at different temperature in attached leaves of three East African plants. (Croton, Gynandropsis and Amaranthus species) respectively which were grown outside with the same condition while water and carbon (iv) oxide are not limiting factors in this experiment.

Rate of photosynthesis was expressed in terms of carbon (IV) oxide uptake in mg/mm<sup>2</sup>/hr at various temperatures as tabulated below.

Temperature °C	Rate of Photosynthesis (mg/mm <sup>2</sup> /hr)		
	Gynadropsis sp	Crotolasis sp	Amaranthus sp
5	-	20	-
10	22	40	10
15	50	49	27
20	60	64	42
25	80	48	55
30	85	45	54
35	80	42	50
40	73	31	45
45	66	15	40
50	2	-	11

a) Represent the results graphically (rate of photosynthesis against temperature)

b) Using the graph in (a) above indicate optimum temperature for the Gynandaropsis and Amaranthus species **(2 marks)**

- Gynandaropsis .....
- Amaranthus.....

c) Give a reason why Gynandaropsis and Aaranthus could not function photosynthetically at 5°C. **(1 mark)**

.....

d) What are the possible ecological habitats for the following plants **(2 marks)**

- (i) Amaranthus.....
- (ii) Crotolaria.....

e) At what temperature was the amount of carbon (IV) oxide around the leaf of Gynandaropsis highest? **(1 mark)**

.....

f) What raw material required in the light stage of photosynthesis. **(1 mark)**

.....

g) Name the parts of chloroplasts in which the following stages of photosynthesis take place. **(2 marks)**

- (i) Light stage

.....

(ii) Dark stage

.....

**h)** State one structural similarity and difference between chloroplast and mitochondria. **(2 marks)**

Similarity

.....

Difference

.....

**i)** What is the compensation of photosynthesis? **(1 mark)**

.....

.....

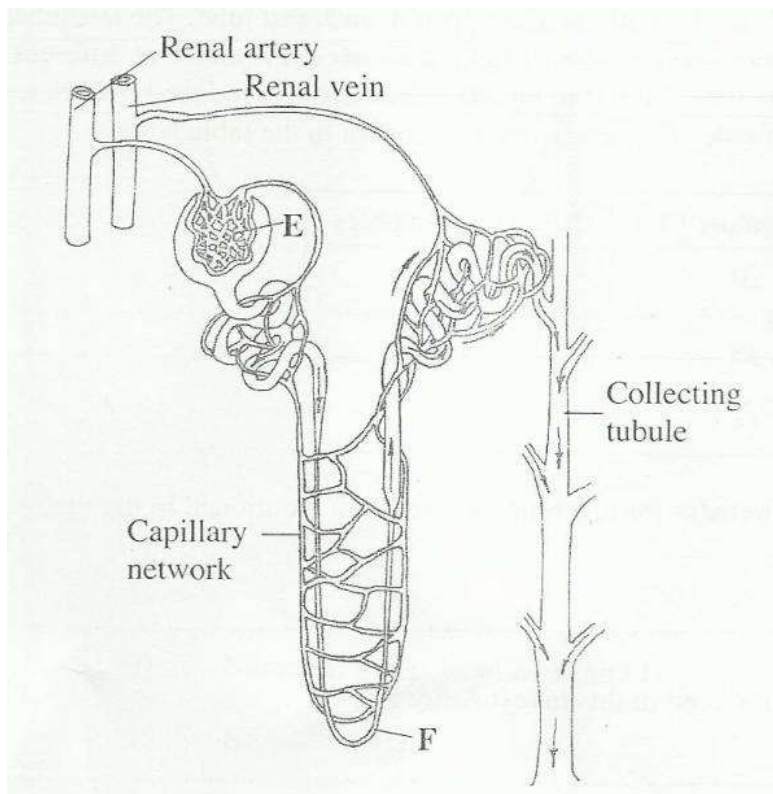
289.(a) Explain the role of mammalian skin in thermoregulation. **(10 marks)**

(b) Describe how the alveolus is adapted to perform its functions. **(10 marks)**

290.(a) Discuss the evidence of organic evolution. **(10 marks)**

(b) Describe how the xerophytes are adapted to their habitat. **(10 marks)**

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

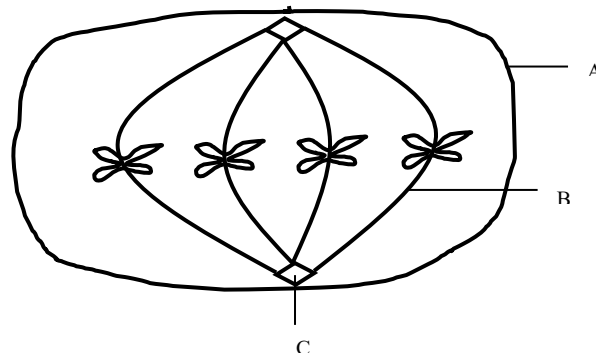


- (a) Name the part labeled E. (1 mark)
- (b) How is the part labeled F adapted to its function? (4 marks)
- (c) State three physiological mechanisms of controlling the human body temperature during a cold day. (3 marks)

292. The genetic disorder hemophilia is due to a recessive sex linked gene. A man who is hemophilic marries a woman who is carrier for the condition.

- a) Using letter H to represent the gene normal condition and letter h for the gene for hemophiliac condition.
- i) What is the genotype for the man and the woman? (2marks)
- ii) Work out a cross between the man and woman (3marks)
- b) What is the chance that both the first and second sons will be hemophiliac? (2marks)
- c) Hemophilia is more common in males than in female humans. Explain (1mark)

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



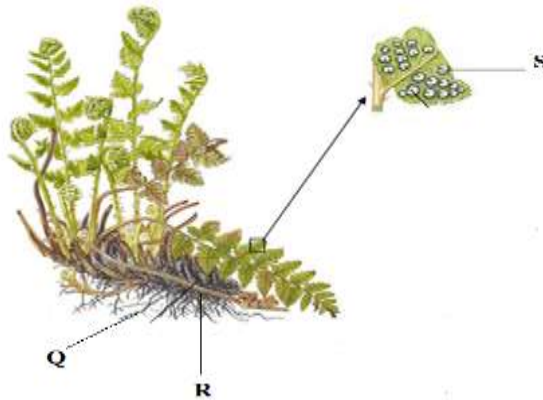
(a) Name the stage of cell division illustrated in the diagram above. (1 mark)

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

(c) State **THREE** differences between mitosis and meiosis. (3 marks)

(d) Name the process during which the exchange of genetic materials occur at prophase 1 of meiosis. (1 mark)

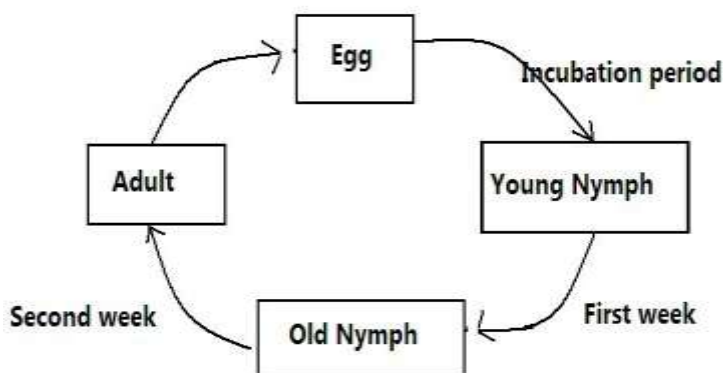
294. The diagram below indicates an organism that grows under shaded places with damp conditions. Study it and answer the questions that follow.



- (a) Name the division to which the specimen belongs. (1 mark)
- (b) Name and state the functions of the parts labeled Q, R and S. (6 marks)
- (c) Name the two body forms of the organism in its alternation of generation. (2 marks)

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

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



- a) Name the hormone that would be at high concentration during.
- (i) First week (1mark)  
 (ii) Second week (1mark)
- b) Name the structure that produces hormone in a (ii) above (1 marks)
- c) Name the series of stages through which the nymph undergoes to reach adult stage (1 marks)

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

Salt concentration (g/dm <sup>3</sup> )	% of RBC destroyed By haemolysis
0	100
1	100
2	100
2.5	100
3.0	100
3.5	96
3.7	80

4.0	60
4.5	16
4.7	0
5.0	0
6.0	0

- (a) Draw a graph of percentage of red blood cells haemolysed against salt concentration. **(6 marks)**
- (b) Explain haemolysis of red blood cells. **(3 marks)**
- (c) From the graph, state:
- (i) the salt concentration at which 50% red blood cells were haemolysed. (1 mark)**
- (ii) the highest salt concentration when the largest number of red blood cells were haemolysed. (1 mark)**
- (d) (i) Suggest the normal salt concentration in the blood of the mammal from which the red blood cells were obtained. **(2 marks)**
- (ii) Give a reason for your answer in (d) (i) above. **(1 mark)**
- (iii) What term is used to describe the solution with equal solute concentration as that of the cells? **(1 mark)**
- (e) Name the process in the human body that ensures that haemolysis of red blood cells is prevented. **(1 mark)**
- (f) State four roles of osmosis in organisms. **(4 marks)**
297. Describe the role of hormones in the mammalian female reproductive cycle. **(20 marks)**
298. Describe the
- (i) Process of inhalation in mammals **(10 marks)**
- (ii) Mechanism of opening and closing of stomata **(10 marks)**



299.a) Using the diagrams below, construct a dichotomous key that can be used to identify the leaves.  
(2mks)



WHITE CLOVER



COTTON WOOD

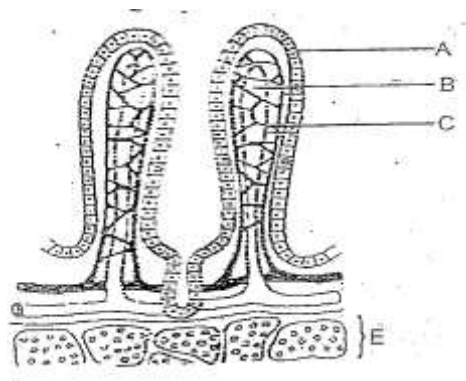


HONEY LOCUST

b) State two reasons for classifying living organisms

(2mks)

300. The diagram below is a cross section through a part of human ileum.



- (a)(i) Identify the structure drawn above (1 mark)  
 (ii) State the significance of the structure shown above. (1 mark)  
 (b) Name the parts labelled A, B and C (3 marks)  
 (c) Give the functions of the part labelled B and C (2 marks)  
 (d) Name the cell organelle more abundant in goblet cells. (1 mark)

301.a) In human, premature baldness is controlled by a gene on the **Y** chromosome. Using **B** to represent the gene for baldness, work out a cross between a bald man and his wife. (4mks)

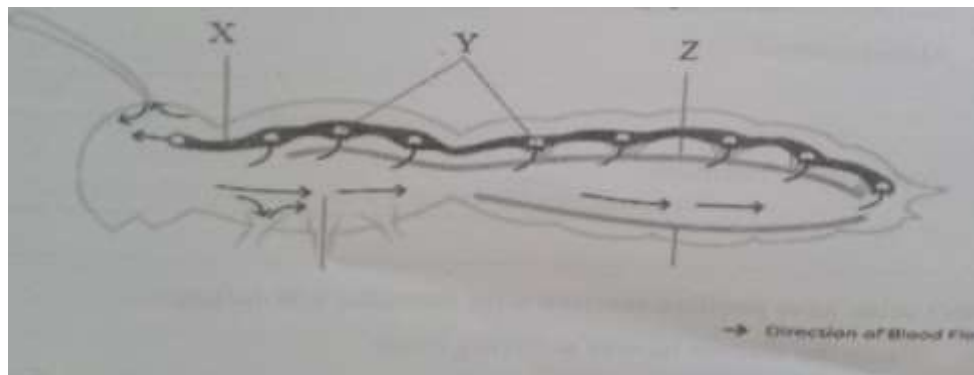
(b)i) What is the probability of their daughters being bald? (1mk)

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

(c) Name one trait in human beings that is determined by multiple allele. (1mk)

(d) Name one genetic disorder affecting the red blood cells. (1mk)

302. Study the diagram below and answer the following questions.



(a) i) Identify the type of circulatory system shown in diagram above. (1mk)

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

(b) Name the parts labelled X, Y and Z. (3mks)

(c) Explain the disadvantage of having the above circulatory system in the animals. (2mks)

(d) Explain why amoeba lack a circulatory system. (1mk)

303. An experiment was carried out to find out the concentration of ions in the cell sap of an aquatic plant and that of the pond water in which they were found.

Ions	Concentration in	
	Cell sap	Pond water
Na <sup>+</sup>	50	1.2
K <sup>+</sup>	49	0.5
Mg <sup>2+</sup>	11	3.0
Ca <sup>2+</sup>	13	1.3
Cl <sup>-</sup>	101	1.3
SO <sub>4</sub> <sup>2-</sup>	13	0.67

- (a)(i) Name the process by which the aquatic plant absorbs ions from pond water. (1 mk)
- (ii) State the four roles of the process you have named in (a)(i) above in a mammalian body. (4 mks)
- (b) Name the cell structure that allows passage of ions in and out of the cell. (1mk)
- (c) How can the rate of uptake of ions by the aquatic plant be increased. (2mks)

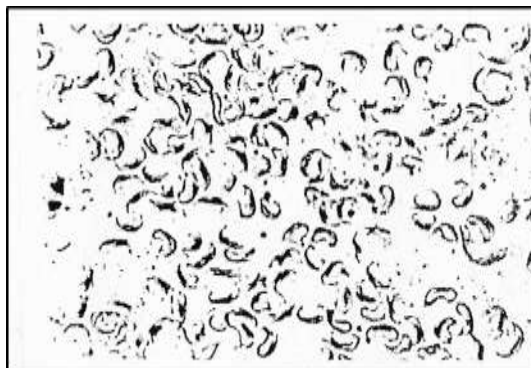
304. The glucose level in mg per 100cm<sup>3</sup> of blood was determined in two persons Y and Z. Both had stayed for six hours without taking food. They were fed on equal amount of glucose at the start of the experiment. The amount of glucose in their blood was determined at intervals. The results are shown in the table below.

Times in minutes	Glucose level in blood in mg /100cm <sup>3</sup>	
	Y	Z
0	85	78
20	105	110
30	105	110
45	130	170
60	100	195
80	93	190

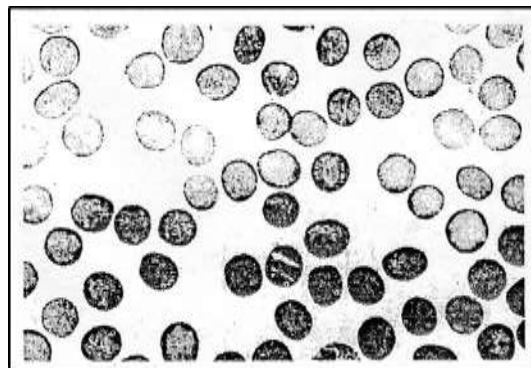
100	90	140
120	90	130
140	88	120

- a) On the grid provided, plot graphs of glucose levels in blood against time on the same axes. (7mks)
- b) What was the concentration of glucose in the blood of Y and Z at the 50<sup>th</sup> minute? (2mks)
- c) Account for the level of glucose in present Y
- i) During the first 45 minutes. (2mks)
- ii) After 45<sup>th</sup> minute to the end. (4mks)
- d) Account for the decrease in glucose level person Z after 60 minutes. (2mk)
- e) Low blood sugar level is harmful to the body. Explain. (3mks)
305. (a) (i) Give four modes of expressing food relationship in an ecosystem. (4 marks)
- (ii) Explain how food as a factor regulate the population of animals in an ecosystem. (8 marks)
- (b) How are desert plants adapted to conserving water? (8 marks)
306. Describe the structure and functions of various organelles in a mature animal cell. (20mks)

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



Blood sample from person **A**



Blood sample from person **B**

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

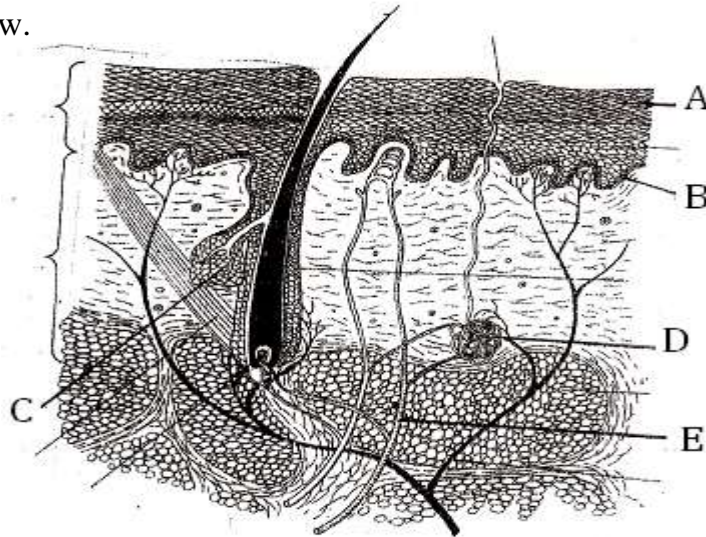
308. The results in the table below show the effects of some conditions for seed germination. In each experiment, all other environmental conditions were kept constant, except for the one being investigated.

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

- a) i) What was the purpose of pyrogallic acid in experiment (P) (1mark)
- ii) State the aim of the experiment (L) (1 mark)
- b) i) Account for the results obtained in experiment set-up (M). (3marks)
- ii) State why 100% germination was not achieved in experiment (V) (L) (1mark)

- c) Of what biological significance is the condition necessary for germination being investigated by experiment (V). (2marks)

309. The figure below is a photomicrograph of a section of mammalian skin. Study it and answer the questions that follow.



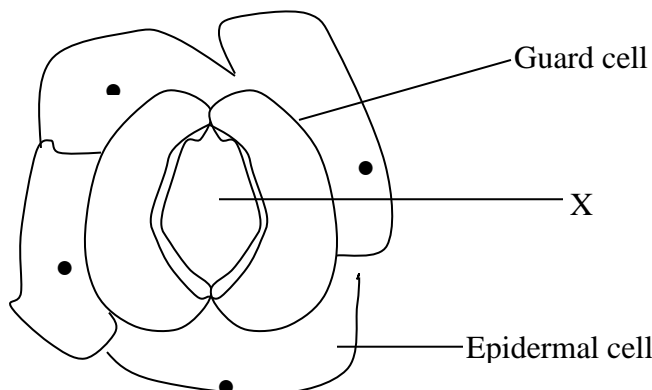
- i) Suggest why only one complete hair follicle is visible in the figure. (1mark)
- ii) State **two** functions of the secretion from the gland labeled C (2marks)
- iii) Indicate on the photograph by means of line labeled 'K' a muscle that contract to make hair become erect. (1mark)

iv) Name the parts labeled (3marks)

- A .....
- B .....
- D .....

v) Explain the behaviour of structure E when environmental temperature falls to 10<sup>0</sup>C. (2marks)

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





- a) i) Name the structure labelled **X** on the diagram. (1 mark)
- ii) State **three** adaptations of the guard cell to its function of opening and closing of stomata in plants. (3 marks)
- b) The mammalian lung is known to have adapted the mammal to terrestrial habitat by having a pleural membrane.
- i) State **two** functions of a pleural membrane that gives the mammal advantage over other organisms. (2 marks)
- ii) Name **two** diseases of the respiratory system. (2 marks)

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



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

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

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

- a) Using the same axis, plot a graph of sugar against time. (6 marks)
- b) At what time was the amount of sugar highest in the:
- Ringed stem.....(1 mark)
  - Normal stem.....(1 mark)
- c) i) How much sugar would be in the ringed stem if it was measured at 0345hours? (1 mark)
- ii) Give reasons why there was sugar in the stems of both trees at 0645hours. (2 marks)
- d) Account for the shape of the graph for the tree with ringed stem between:
- 0645 hours and 1545 hours. (3 marks)
  - 1545 hours and 0045 hours. (2 marks)
- e) Name the structures in the phloem that are involved in the translocation of sugars. (2 marks)
- f) Other than sugars, name **two** compounds that are translocated in the phloem. (2 marks)
313. a) State the causes of air pollution (5marks)
- b) Describe how air pollutants affect organisms hence state how air pollution can be alleviated (15mks)
314. Describe how a bony fish like tilapia is adapted to locomotion in aquatic habitat. (20mks)



315. 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 develop this condition from birth.

i) What are the likely genotypes of this couple? (2mks)

Man

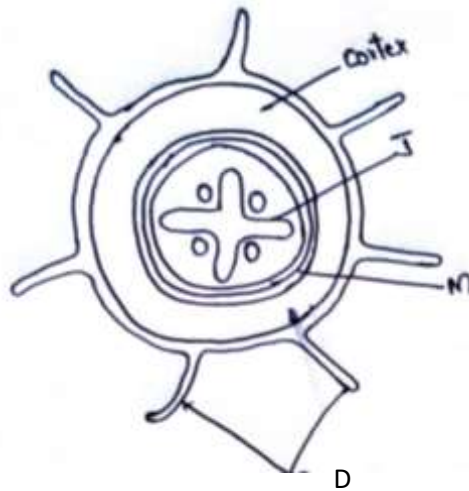
Woman

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)

316. 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)

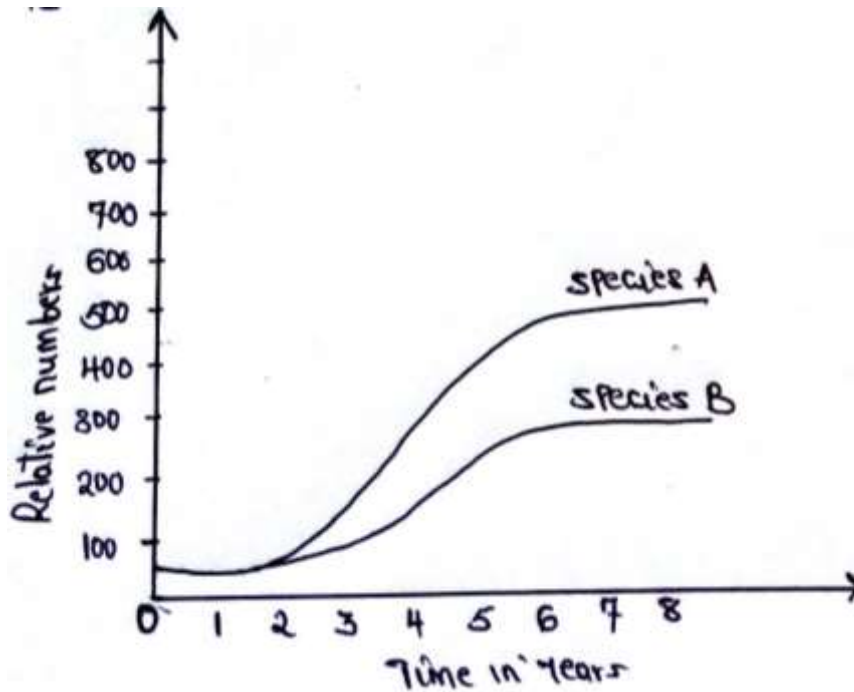
ii) Structure labelled J is described as a mechanical tissue. Explain (1mk)

b) i) Name the process by which water passes across structure M (1mk)

ii) Explain two ways by which cells with structures D are adapted to their functions (2mks)

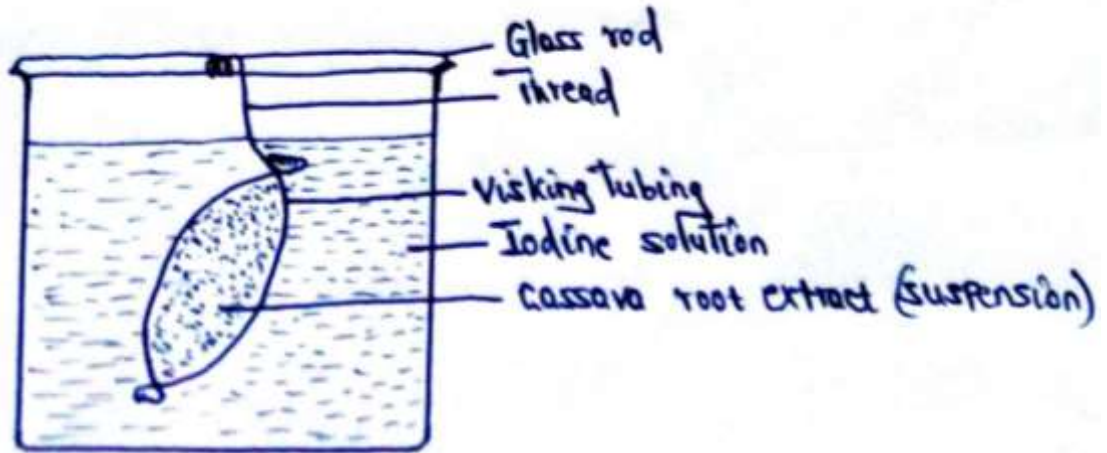
c) Name two strengthening materials that strengthen the collenchyma tissue (2mks)

317. 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)

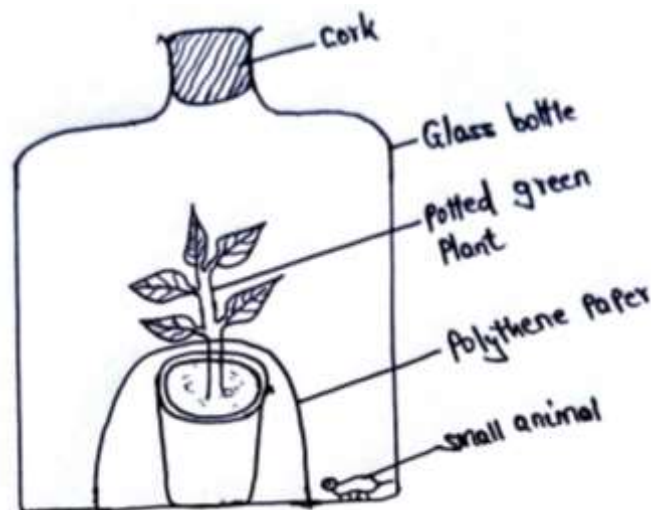
318. A student from Abogeta secondary set up an experiment as illustrated below.



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)

319. 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

320. 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;
  - i) 0-1 hour (2mks)
  - ii) 1-2 hours (3mks)
  - iii) 2-4 hours (3mks)
  - iv) 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)

321. a) Describe the opening and closing of the stomata using the photosynthetic theory (10mks)

b) Describe blood sugar regulations in mammals (10mks)

322. a) Describe the adaptation of the following plants to their habitat;

i) Xerophytes (15mks)

ii) Hydrophytes (5mks)

323 (a) the table below shows the concentration of sodium and iodine ions in pond water and in the cell sap.

	Sodium ion concentration	Iodine concentration
Pond water	180	0.4
Cell sap	90	500

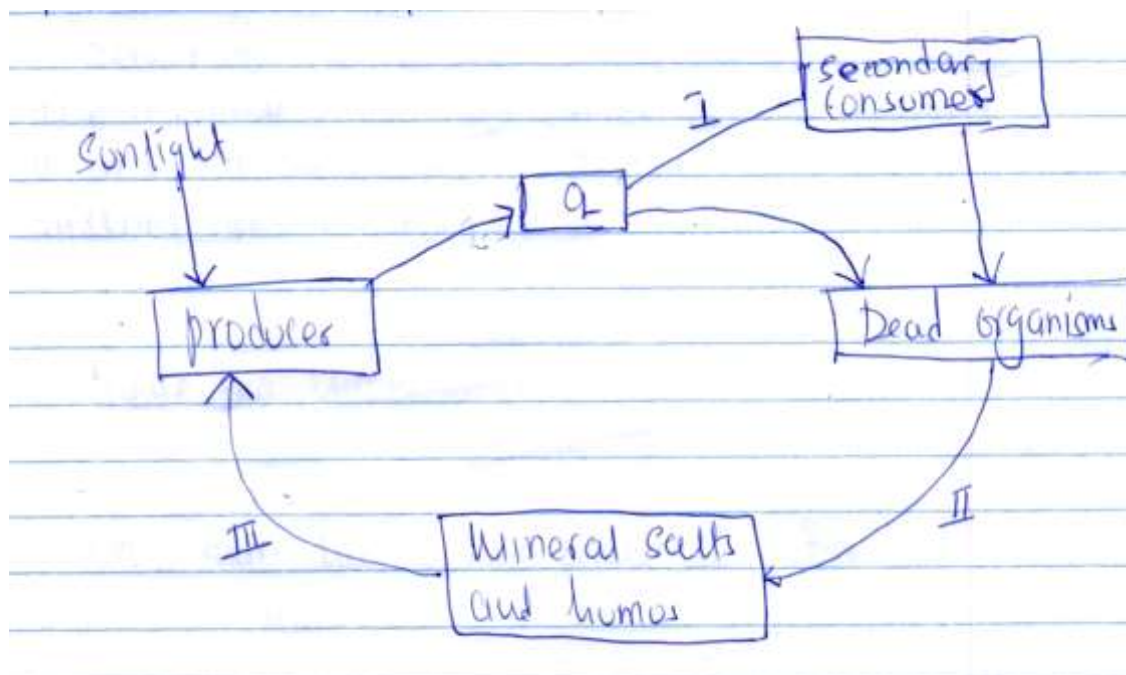
Giving reasons name the process through which each of the ions is taken up by the plants

- (i) Sodium ion (2mks)
- (ii) Iodine ion (2mks)

(b) The lettuce plant was then treated with a chemical substance that inhibits the synthesis of ATP Giving a reason, state which ion was affected by the treatment (2mks)

(c) Explain why fresh water fish cannot survive in marine habitat (2mks)

324. The diagram below represents recycling of nutrients in a certain ecosystem



(a) Name the trophic level represented by Q (1mk)

(b) Name the process represented by: (3mks)

I

II

III

(c) Name the organism involved in process II (1mk)

(d) What would happen within the ecosystem if all the secondary consumers were eliminated? (3mks)

325. (a) what is non disjunction (1mk)





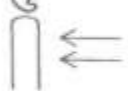
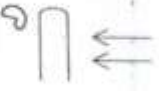




(b) Haemophilia is a sex linked trait

(i) If a normal woman but carrier for haemophilia marries a normal man, work out the phenotype of the offspring using a genetic cross (3mks)

(ii) Name two chromosomal disorders (2mks)

(c) Other than haemophilia, state any other two sex - linked defect in man (2mks)

326. An experiment was set to investigate the effect of unilateral light on the growth of oat coleoptiles. The diagram in the table represents the experimental set ups the start and the result at the end of experiment.

Set up	Start of experiment	End of experiment
A		
B		
C		
D		
E		

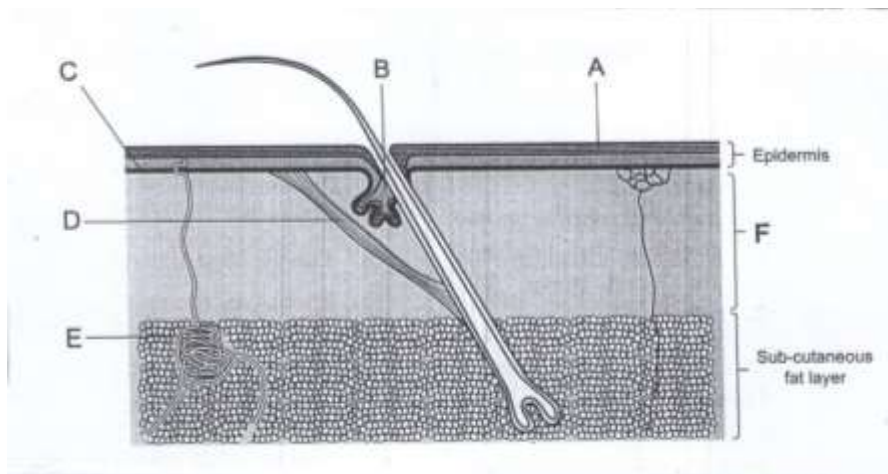
(a) Account for the reaction in experiment set up A (3mks)

(b) Explain the purpose of experiment set up B and C (3mks)

(c) Explain the results in the experiment set D and E (2mks)

327. The diagram below represents a transverse section through mammalian skin





- (a) Name the structures A and B (2mks)
- (b) (i) Explain how the hair in human beings helps in keeping the body warm (3mks)
- (ii) Explain other methods by which the skin helps to keep the body warm (3mks)

328. The table below shows how the width of the stomata and the wind speed can affect the rate of transpiration from a leaf of a plant. The width are measured in micrometers (nm)

Width of stomata in (nm)	Rate of transpiration in gm/M <sup>2</sup> / hour	
	In still air	In wind
0	0.0	0.0
5	0.9	4.0
10	16.0	7.0
15	2.0	8.4
20	2.2	9.0

- (a) On the same axes plot a graph of rate of transpiration against width of the stomata (8mks)
- (b) Use your graph to predict the rate of transpiration when the stomata have a width of 8nm
- (c) Describe the relationship between the width of stomata and the rate of transpiration in still air (3mks)
- (d) Explain why the rate of transpiration in wind differs from rate in still air (3mks)
- (e) Explain why transpiration is important in plants (4mks)
329. Describe the various ways in which seeds and fruits are adapted for dispersal (20mks)
330. (a) State the possible application of the following plants hormones in agriculture (8mks)
- (i) Auxins



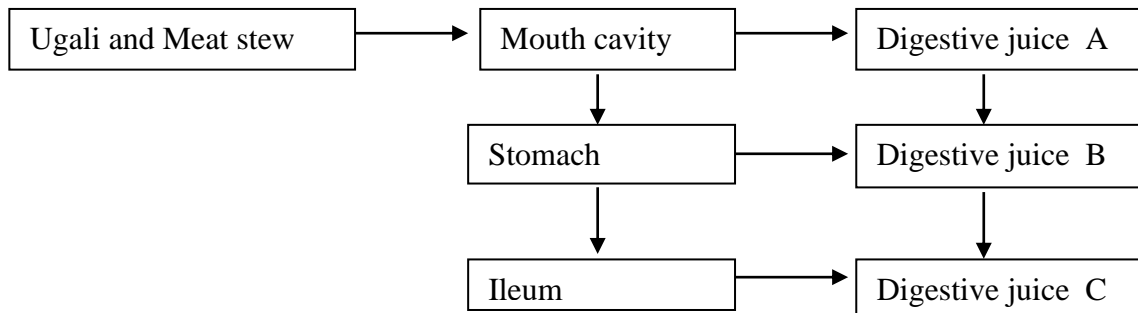
(ii) Gibberellins

(b) Explain how each of the following serves as evidence of organic evolution

- |                                 |        |
|---------------------------------|--------|
| (i) Fossil records              | (3mks) |
| (ii) Comparative anatomy        | (6mks) |
| (iii) Geographical distribution | (3mks) |

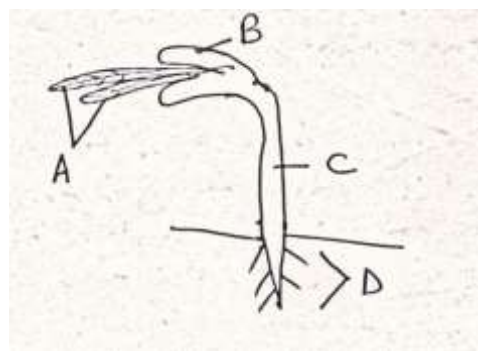
331. The flow diagram below represents passage of a meal through the human digestive system.

Study the diagram and answer the questions that follow.



- (a) Name the physical process that will occur in mouth cavity (1mk)
- (b) Name the digestive juices **B** and **C** (2mks)
- (c) Explain **two** ways in which the digestive system is protected from corrosive effects of digestive juices. (2mks)
- (d) Name the hormone that stimulate secretion of juice **B**. (1mk)
- (e) Identify **two** contents of digestive juice **A** (2mks)

332. Examine the diagram below and answer the questions that follows



- a) Name the parts labeled A-D (4mks)
- b) State the type of germination exhibited by the seedling above (1mk)
- c) State and explain three environmental conditions necessary for germination. (3 marks)

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

- a) What were the parental genotypes? (2mks)
- b) Work out the cross between f1 generations (4mks)
- c) State the phenotypic and genotypic ratios of the f2 generations (2mks)

334. (a) What is meant by:

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

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

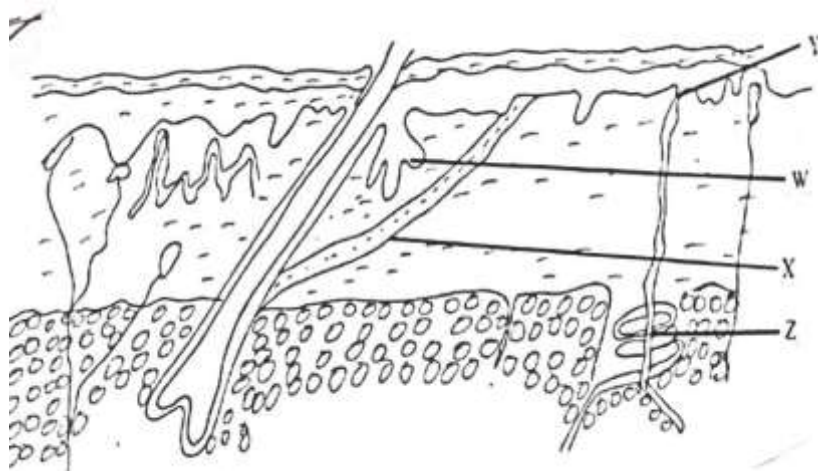
Leaf	Number of stomata	
	Upper epidermis	Lower epidermis
A	300	0
B	150	200
C	02	13

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

- A
- B
- C

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

335. The diagram below shows a section through the mammalian skin



- a. Name the parts labeled Y and X (2mks)
- b. State the function of the parts labeled W and Z (2mks)
- c. Explain the changes that occur on the skin when it is cold (4mks)

336. In an experiment, three healthy rabbits were fed with equal amounts of carbohydrates. After 1 hour their blood sugar glucose concentration was measured at 30 minutes intervals for 3 hour.

The results are as shown in the table below.

Glucose concentration Mg/ml Rabbit	Initial time(minutes)	30 Minutes	60Minutes	90 Minute	120 Minute	150 Minute	180 Minute
P	1.6	1.55	1.43	1.36	1.3	1.19	1.11
Q	1.49	1.39	1.34	1.32	1.27	1.2	1.09
R	1.59	1.39	1.33	1.27	1.18	1.1	0.99
Mean	1.56	1.44		1.32	1.25	1.16	-

a.(i) Calculate the **mean** glucose concentration 1mg/ml of blood at 60 and 180 minutes.

(2mks)

(ii) On the grid provided plot a graph of mean glucose concentration against time. (6mk)

(iii) What was the mean concentration in the blood after 75minutes? (1mks)

(iv) Why was it necessary to use 3 rabbits in the experiment? (1mks)

(v) Account for differences in mean glucose concentration between initial time and 180 minutes. (3mks)

(b) Name three products of digestion other than glucose (3mks)

(c) What is the fate of excess glucose in:

(i) Plants? (2mks)

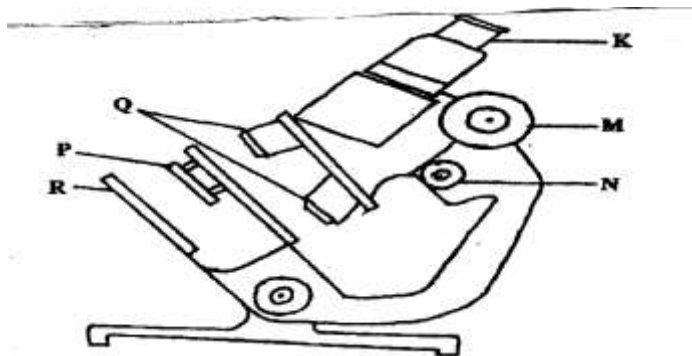
(ii) Animals ? (2mks)

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

338(a) How are structures of the human eye adapted to their functions (14 marks)

(b) State three defects of the eye and how each can be corrected (6 marks)

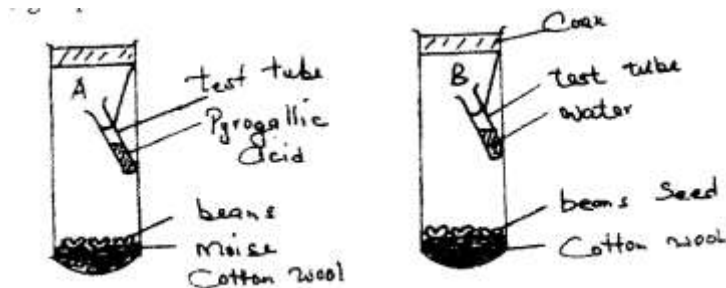
339. The diagram below shows some components of a light microscope.



- 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;-
- (ai), 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
340. 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
- bi), Using a punnet square, show the genotypes of the children resulting from this marriage 3mks
- 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

341. 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

342. 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

- bi), Name one defect of circulatory system in humans. 1mk
- ii), State three functions of blood other than transport. 3mks

343. 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 in 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
- ci), 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

344. 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 <sup>c</sup> in tube	
	A	B
0	80	80
5	54	67
10	40	59
15	29	52
20	21	47
25	18	46

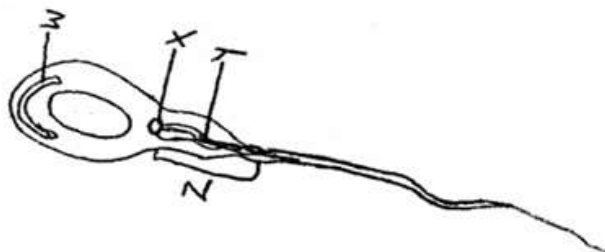
- a), On the same axis, plot graphs of water temperature against time (min) 8mks
- b), Find the rate of cooling in A 1mk
- c), Why was test B included in the set up? 1mk
- d), Name two ways through which heat is lost in tube B. 2mks
- e), State the expected results if tube A was insulated. 1mks
- f), 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
- 345.** 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
- 346.** Discuss the nitrogen cycle. 20mks

347. 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).
- 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)
  - 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)

348. 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 marks)

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

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

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

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

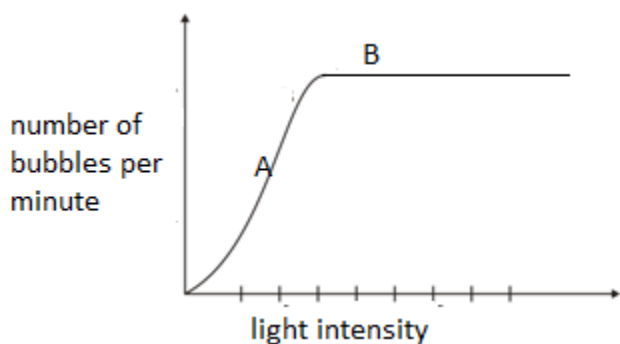
Genotype	Alleles	Expected number of digits per hand.
Homozygous dominant		Six
	bb	
Heterozygous.	Bb	

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

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

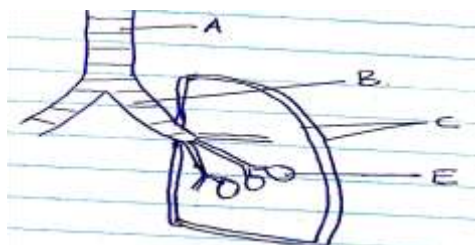
c) State the two types of variation (2mks)

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



- a). write the equation to account for the air bubbles. (1mk)
- b). Name the factor that affects photosynthesis at point A. Explain. (2mks)
- c). Explain why the rate of photosynthesis does not increase any further at high light intensity.(point B) (2mks)
- d). Explain the role of the following in photosynthesis.
- i) Chlorophyll. (1mk)
- ii) Water. (1mk)
- e). Name one product of the light stage of photosynthesis used in the dark stage of photosynthesis. (1mk)

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

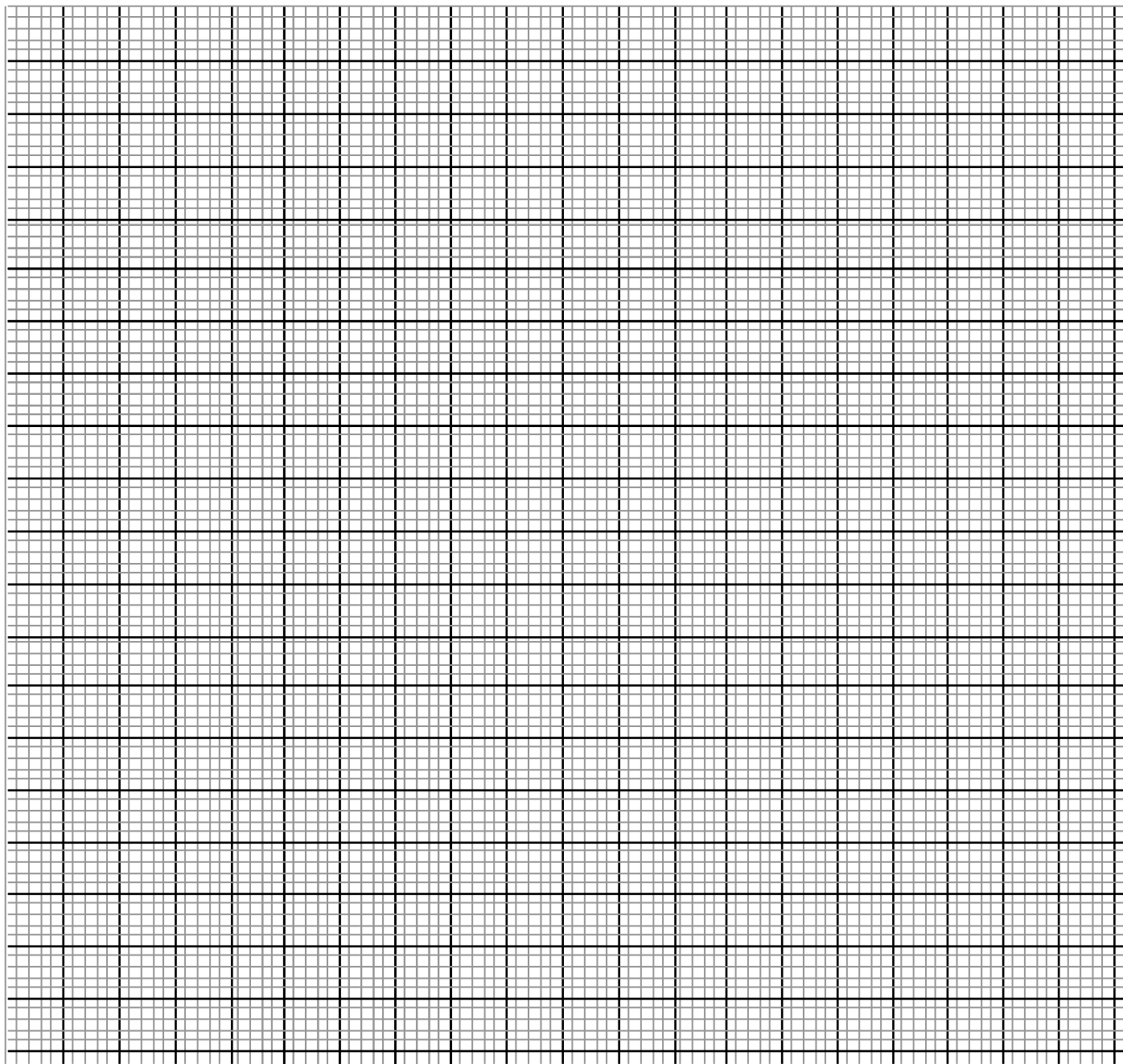


- a) Name the part labeled A and B (2marks)
- b) State the function of the part labeled C (2marks)
- c) How is the part labeled E adapted to its function (2marks)
- d) Identify the structure that perform the same function as one illustrated above in (2marks)
- i) Amoeba
- ii) Fish

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

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

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



- b) Suggest what happens to the insect's population during dry month. (2mks)
- c) Explain the relationship between the insect population and that of the predators. (3mks)
- d) Suggest what happens to the predator's population during the dry month. (2mks)

e) Name the trophic level occupied by (3mks)

i) Predator.

ii) Insect.

iii) Grass.

f) Name the method used to estimate population of (3mks)

i). Predator.

ii. Insect.

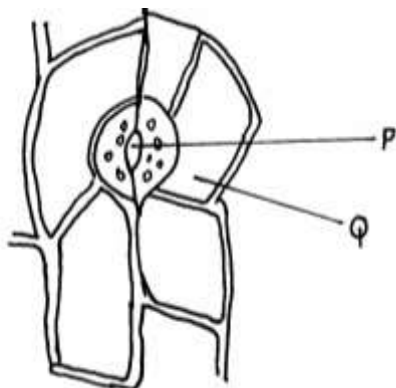
iii. Grass.

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

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

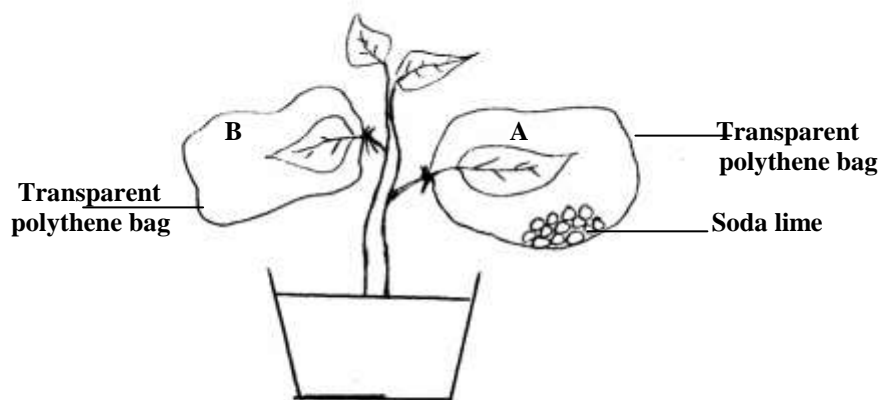
b) State the changes that take place in a flower after fertilization. (5mks)

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



- Name the parts labeled P and Q. (2mks)
- Briefly describe the photosynthetic theory of stomata opening. (5mks)
- State one modification in the stomata of xerophyte plant other than being sunken and hairy. (1mk)

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



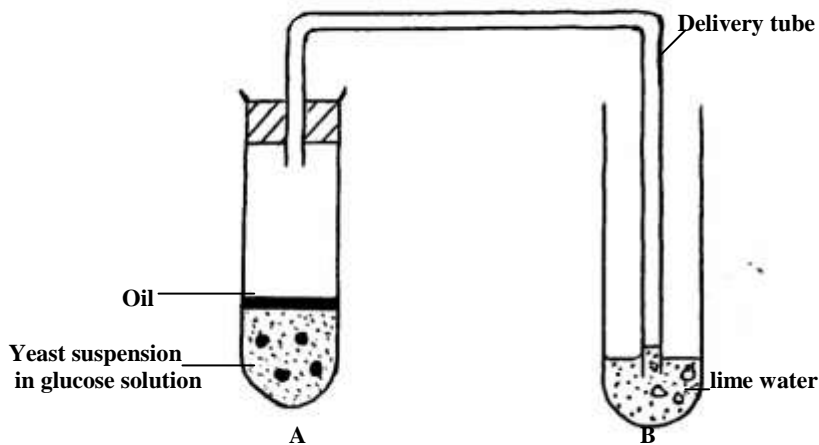
The set up was placed in darkness for 24 hrs and then exposed to light for 5 hrs.

- What was the aim of the experiment? (1mark)
- Leaves A and B were tested for starch.
  - What would be the expected results? (2marks)
  - Give reasons for your answer in (b) (i) above. (2marks)
- What was the role of leaf B in the experiment (1mark)

(d) **Why** was the set – up placed in darkness for 24 hours? (1mark)

(e) **Name** the organelle in a plant where photosynthesis takes place (1mark)

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

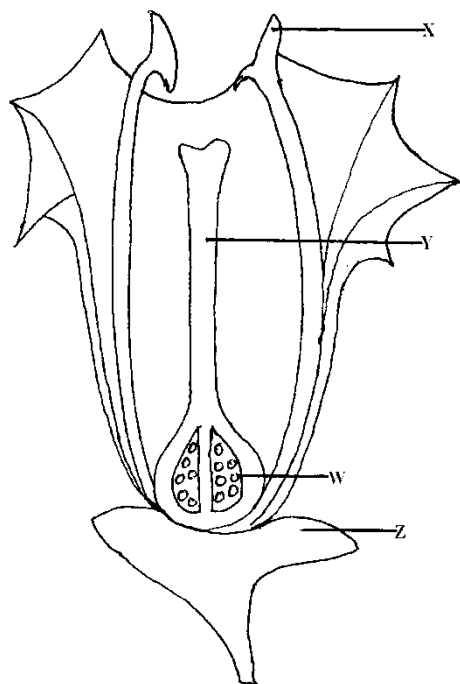


Before adding yeast suspension in tube **A**, the glucose solution was first boiled and cooled.

- a. **What** biological process was being demonstrated? (1mark)
- (b) (i) **What** observation would be made in tube **B** after 20 minutes of the experiment? (2marks)
- (ii) **Account** for the observations made in (b) (i) above (2marks)
- (c) **Write** down an equation to summarize the reaction taking place in tube **A**. (1mark)
- (d) **State two** industrial applications of the chemical reaction taking place in tube **A**. (2marks)

358. The diagram below represents a flower.





- (a) **Name** the parts labeled X and Y. (2mks)
- (b) **Describe** the ovary position. (1mk)
- (c) (i) **Suggest** an agent of pollination of the flower above (1mk)
- (ii) **Give** a reason for your answer above. (1mk)
- (d) On the diagram above, which part do you expect to find haploid nucleus after meiosis? (1mk)
- (e) In the flower above its sepals cell was found to have 20 chromosomes. **What** would be the number of chromosomes found in the endosperm cell of the flower embryo sac after fertilization? (1mk)
- (f) **State one** way in which flowers prevent self – pollination. (1mk)

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

Using letter H to represent the gene for purple colour

- (a) State the genotype of:
- (i) Parents ( 2 mks)
- (ii) F<sub>1</sub> Generation ( 1 mk)

(b) Work out the cross between plants in the F<sub>1</sub> generation (4 mks)

(c) Account for the colour the flowers in plants of the F<sub>1</sub> generation

(1 mk)

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

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

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

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

(6 marks)

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

(1mark)

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

(i) 5°C

(2marks)

(ii) 45°C

(2marks)

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

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

(2marks)

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

(2marks)

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

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

(1mark)

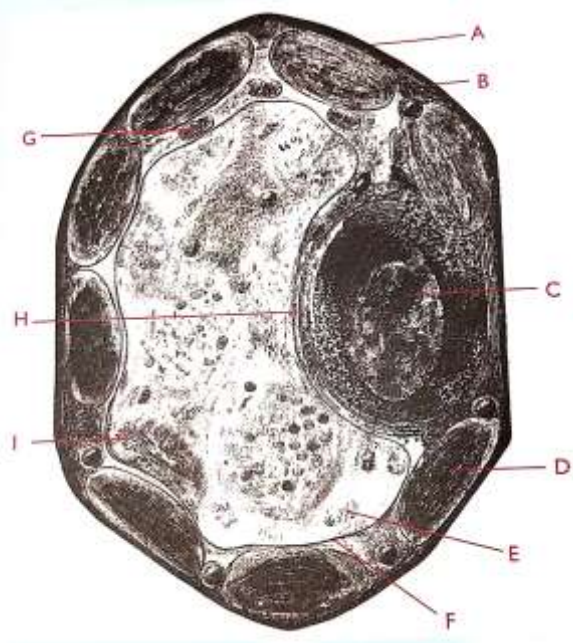
361. How are leaves of mesophytes suited to their function?

(20mks)

362. Describe the adaptations of the mammalian skin to its functions.

(20mks)

363. The diagram shown below is a plant cell as seen when observed under an electron microscope at high power. Study it carefully and use it to answer the questions that follow.



- (a) Name the parts labeled A, C and H. (3 marks)
- (b) State the function of the parts labeled D and G. (2 marks)
- (c) Give two differences between the structures labeled D and G. (2 marks)
- (d) Based on observable features, suggest the main function the cell shown. (1 mark)

364. Study the table below and then answer the questions that follow.

Name of disease	Causative agent	Age when vaccine is administered	Method of vaccination
Tuberculosis	Bacterium	At birth	Injection
Poliomyelitis	Virus	At birth, after 6 weeks, after 10 weeks, after 14 weeks	Oral inoculation
Whooping cough	Bacterium	6 <sup>th</sup> and 14 <sup>th</sup> week	Injection
measles	Virus	9 <sup>th</sup> month	Injection

- (a) What part of the human body is affected by the virus that causes poliomyelitis? 1mk
- (b) Give a reason why some doses of vaccine are given more than once. 1mk
- (c) Suggest a reason for delay in vaccinating against measles until the 9<sup>th</sup> month (1 mark)
- (d) Describe immune response. (2 marks)

- (e) What is a vaccine? (1 mark)
- (f) What is the role of vaccination in providing immunity? (1 mark)
- (g) What triggers an allergic reaction? (1 mark)

365.(a) State **three** limitations of using a quadrat to estimate the population of organisms. (3mks)

b) In an attempt to estimate the number of grasshoppers in the field, a student captured 435 marked and released. Three days later, 620 were captured 75 of which were marked.

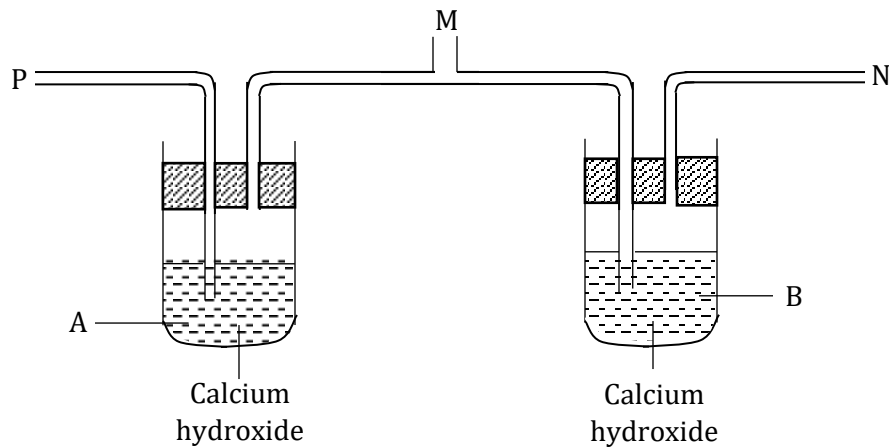
- (i) What is the name of the sampling method describe above? (1 mark)
- (ii) Calculate the approximate population size of the grasshoppers in the field (2 marks).
- (iii) What are the disadvantages of this method? (2 marks)

366. Study the photograph below and answer the questions that follow



- (a) Name the parts labelled A and B and state its functions. (2 marks)
- (b) Identify the mode of feeding of the organism. (1 mark)
- (c) (i) Name the tooth labelled S. (1 mark)
- (ii) State how the tooth named in (c) (i) above is adapted to its function. (2 marks)
- (d) Distinguish between competitive and non-competitive enzyme inhibitors. (2 marks)

367. A student set up an experiment to investigate some aspect of gaseous exchange using the apparatus represented below.



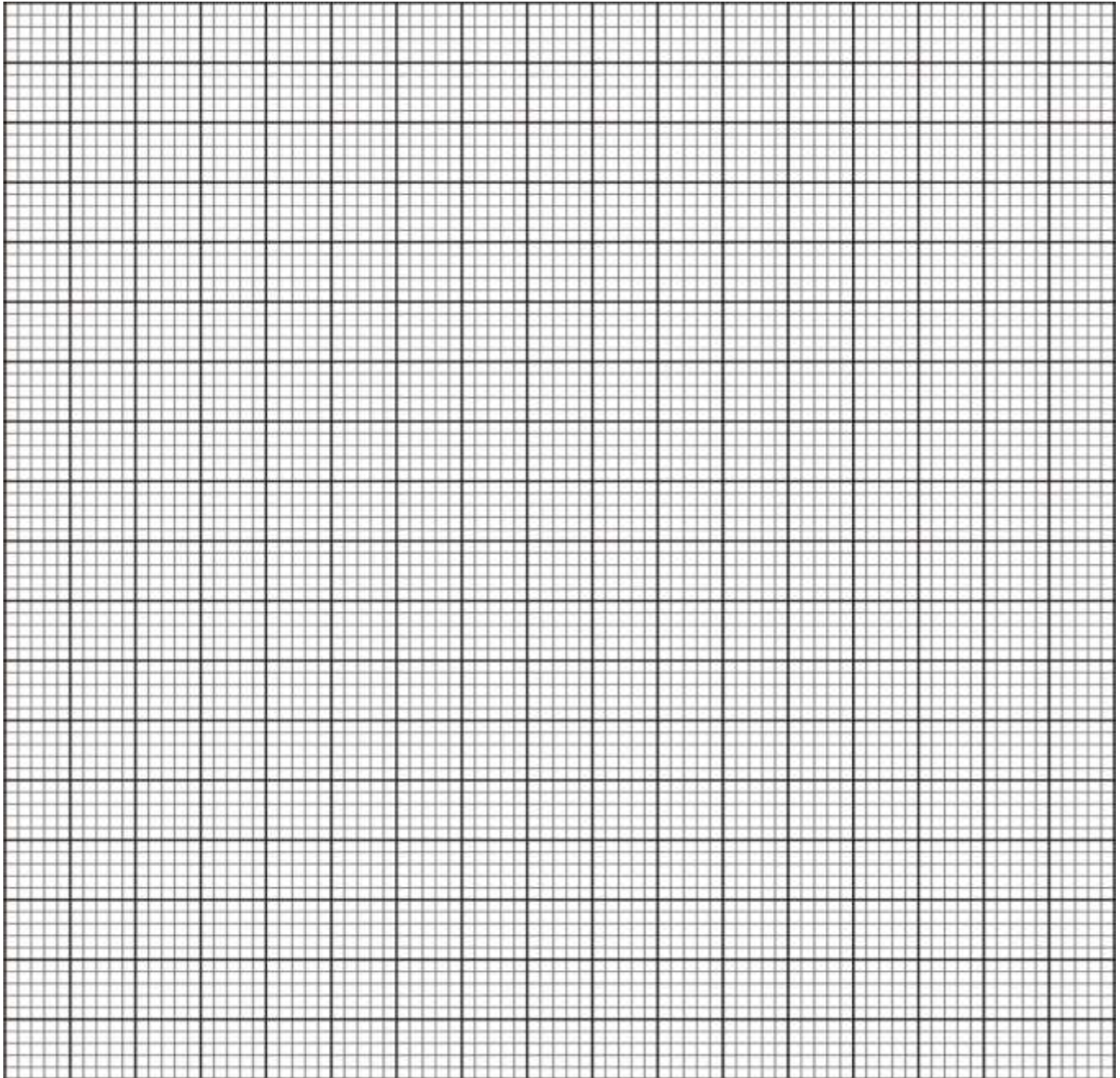
The student placed the mouth at the M and breathed in and out several times through the tube.

- (a) Using arrows show the direction of air movement along tube P and N on the diagram during the experiment. (1 mark)
- (b) Suggest a possible aim of this experiment. (2 marks)
- (c) What results were expected after breathing in and out through tube M several times? (3 marks)
- (d) What characteristics do mammalian lungs and the gills of bony fish have in common that enables them to exchange gases efficiently? (2 marks)

368. The table below shows the concentration of lactic acid in  $\text{mg}/100\text{cm}^3$  in the human blood during and after exercise

Time (seconds)	0	5	10	15	20	25	30	35	40	45	50	55
Lactic acid concentration ( $\text{mg}/100\text{cm}^3$ )	22	25	45	90	86	85	84	60	44	25	22	22

- (a) Using the readings in the table, plot a graph of lactic acid concentration against time [6 marks]



- b) From the graph determine the duration of vigorous exercise [1 mark]
- c) Write an equation leading to the production of lactic acid in humans [1 mark]
- d) i) Suggest the normal concentration of lactic acid in the blood when the person was resting [1 mark]
- ii) What is the effect of lactic acid on the body tissues when its concentration rises above  $90\text{mg}/100\text{cm}^3$  [1 mark]



iii) Give three ways in which the body adjusts to the high concentration of lactic acid [3marks]

e) From the graph determine the time when oxygen debt

i) Occurred [1mark]

ii) Began to be paid in the person's body [1mark]

f) List three differences between aerobic and anaerobic respiration in animals [3marks]

g) Name the product of anaerobic respiration that is essential in: [2marks]

I) The brewing industry .....

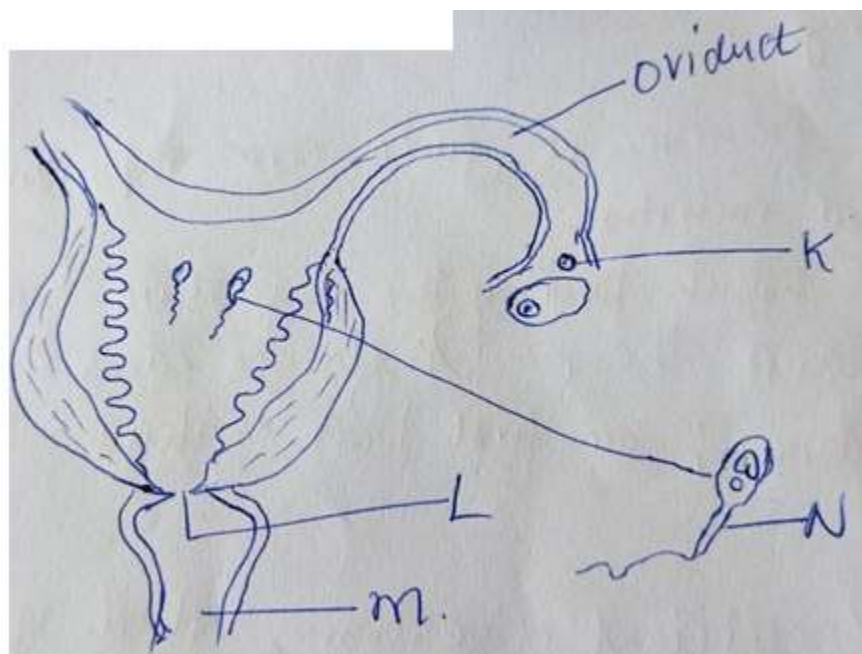
II) The bread making industry .....

369(a) Describe the process of fertilisation in Angiosperms. (15 mks)

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

370. Describe how the mammalian skin is adapted to its functions. (20 mks)

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



(a) (i) Label parts labelled

(2mks)

K –

L -

M-

(ii) Through which process is structure labeled K in (a) (i) above produced?

(1mk)

(b) How is the cell labeled N adapted to perform its functions.

(3mks)

c) Name the hormone that stimulates the production of cell labeled K at puberty. (1mk)

372. Bile and pancreatic juice are important secretions in animal nutrition.

(a) In which part of the digestive system do they exert their influence?

(1mk)

(b)(i) For efficient digestion, which of the two secretions should be mixed with the chyme first?

(1mk)



(ii) Explain your answer (4mks)

(C) Explain why an adult does not need to eat too much protein in a meal/diet. (2mks)

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

Blood group	Frequency	Rhesus +ve	Rhesus -ve
A	26	22	4
B	20	18	2
AB	4	3	1
O	50	42	8

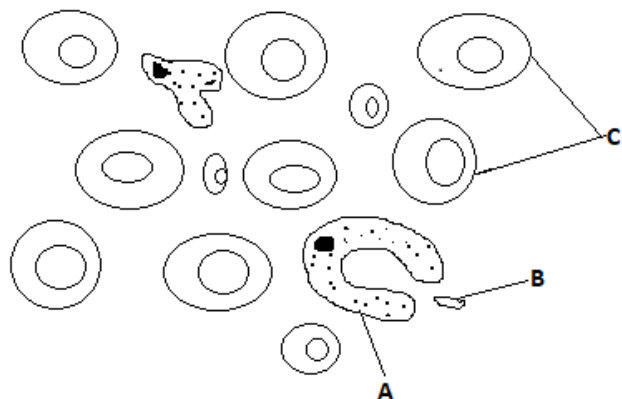
(a) Calculate the percentage of Rhesus negative (Rh-ve) individuals in the population? (1mk)

(b) Account for

(i) The large number of blood group O individuals in a population. (2mks)

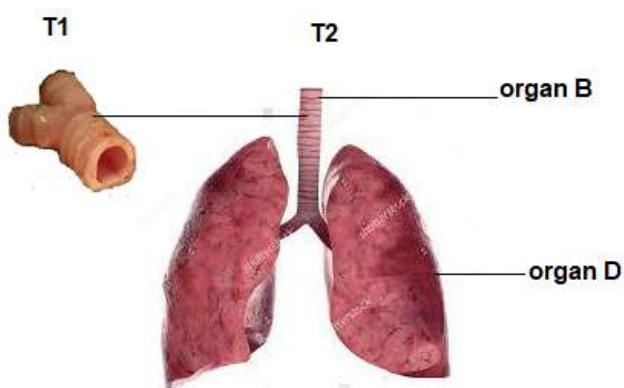
(ii) The small number of individuals with blood group AB. (2mks)

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



- (i) State the importance of structure C being large numbers in the blood smear. (1mk)
- (ii) Give a reason why structure C would be found in large numbers in high altitude than in low altitude. (1mk)
- (iii) Name the process by which structure A would engulf structure B. (1mk)

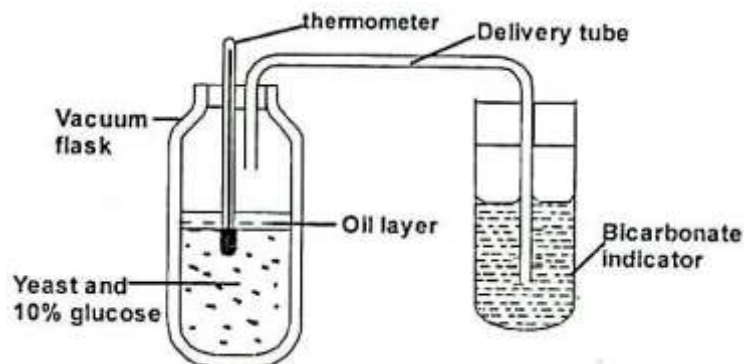
374(a). Identify organs B and D in photograph T2 and state the class of organism from which they were obtained. (4mks)



ORGAN	IDENTITY	CLASS

- (b) State the common function of the organs identified in (a) above. (1mk)
- (c) Name the parts of the body where B and D in photograph T2 are found. (2mks)
  - B
  - D
- (d) List the adaptations of D to its functions. (3mks)
- (e) Using observable features only, state how B is adapted to its function (2mks)

374. The set apparatus was assembled by a group of students to investigate some physiological process. Glucose solution was boiled and oil added on top of it. The glucose solution was then allowed to cool before yeast was added.



- a) i) Give ONE aim of the experiment. (1mk)
- ii) Explain observations expected after 24hrs. (2mks)
- b) i) Why was the glucose solution boiled before adding the yeast suspension? (1mk)
- ii) What was the importance of cooling the glucose solution before adding the yeast? (1mk)
- (c) In another investigation, a bird was found to use 10 litres of oxygen to give a respiratory quotient of 0.7 during period of flight.
- i) Name the type of food that was being respired by the bird (1mk)
- ii) Determine the amount of carbon (IV) oxide produced during the same flight. (2mk)

375. Mr. Juma has sued Serenity Hospital on grounds that their child was wrongly identified such that they got the wrong one. The child is blood group O. Mr. Juma is blood group AB while Mrs. Juma is heterozygous blood group A.

- (a) Work out the possible blood group of their offsprings. (4 marks)
- (b) Is Mr. Juma justified in his claims? Explain. (2 mark)
- c) State two blood disorders in humans that result from mutation. (2 marks)

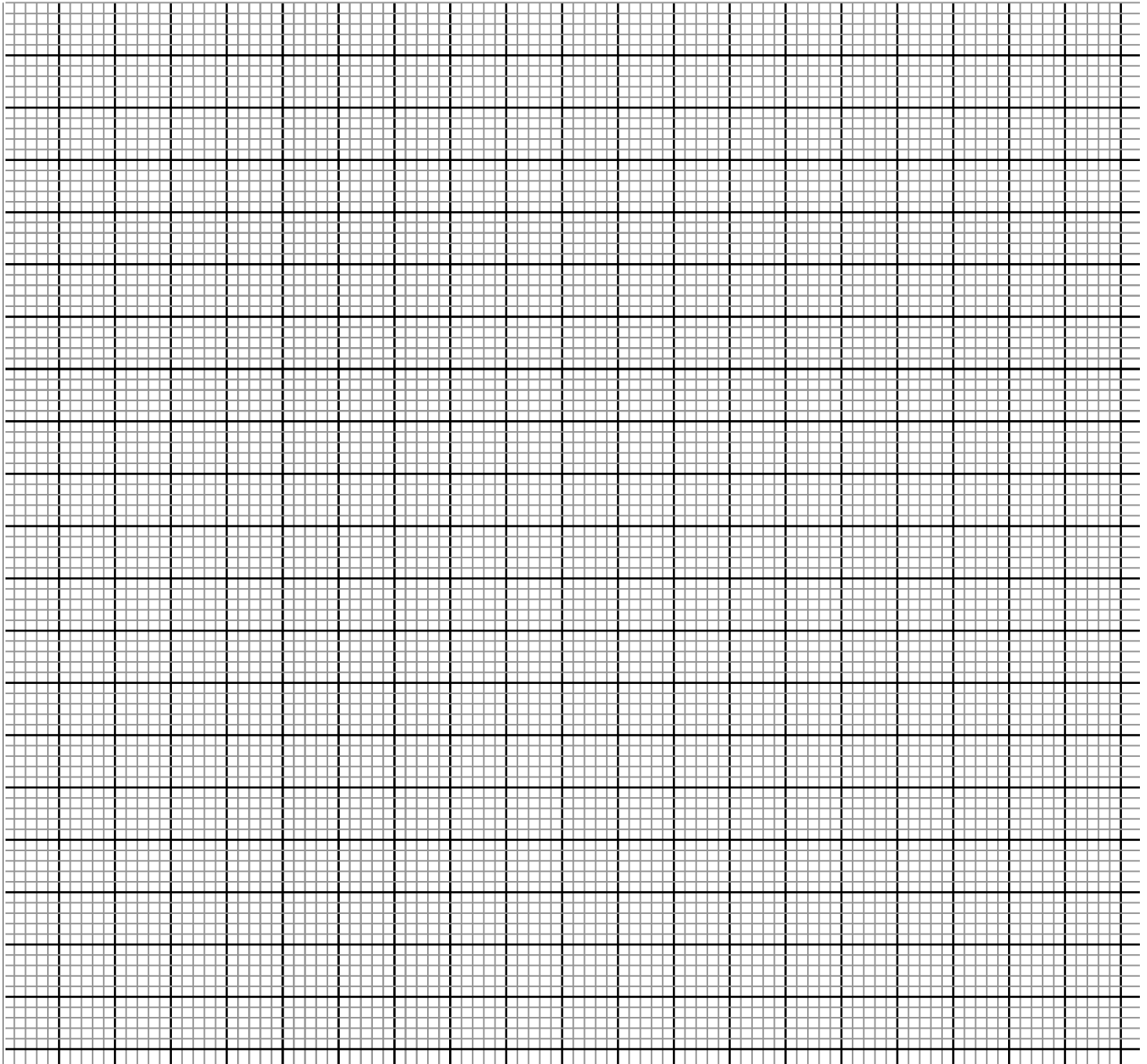
376.A Farmer wished to plant certain species of *Erythrina* trees on his farm. However, their seeds normally take time to germinate after sowing. To overcome this problem, he put the seeds in hot water maintained at 50°C.

Batches of 20 seeds were removed at one minute intervals and then planted in trays containing moist soil. After 15 days, the number of seeds that germinated in each tray was counted.

The results obtained were as shown in the table below.

Batch order	Time intervals(minutes)	Germinated seeds	Percentage of seeds that Germinated.
1 <sup>st</sup>	0	3	
2 <sup>nd</sup>	1	3	
3 <sup>rd</sup>	2	8	
4 <sup>th</sup>	3	15	
5 <sup>th</sup>	4	18	
6 <sup>th</sup>	5	13	
7 <sup>th</sup>	6	10	
8 <sup>th</sup>	7	6	
9 <sup>th</sup>	8	2	
10 <sup>th</sup>	9	0	
11 <sup>th</sup>	10	0	

- a) Calculate the percentage germination rate for each batch and fill in the table. (5mks)
- b) Use your results to plot a graph showing percentage germination against the duration in which the seeds were soaked in hot water. (6mks)



- c) From the graph derive the expected number of seeds that would germinate if soaked for 4.5 minutes.  
(1mk)
- d) Using the graph briefly explain the effect of hot water treatment on seed germination of *Erythrina*.  
(5mks)
- e) Explain why there was no germination of seeds soaked in hot water for nine to ten minutes.  
(1mks)
- f) Besides hot water treatment, suggest two other methods that can be used to speed up germination in *Erythrina*.  
(2mks)

377. Explain the adaptations of parts of the ear in the outer and middle ear. (20 mks)

378. Describe how the kidney Nephron functions. (20 mks)

379. A cross between red flowered plant and white flowered plant produced plants with pink flowers. Using letter **R** to represent the gene for red color and **W** to represent white color;

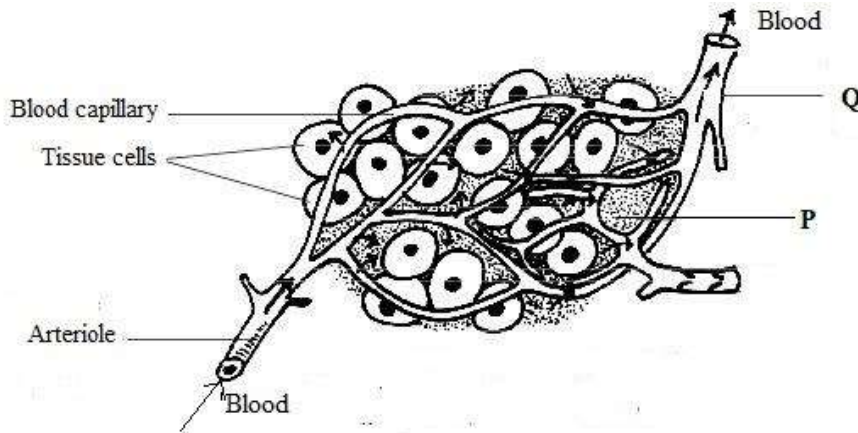
- a. Work out a cross between  $F_1$  plants (4mks)
- b. Give the;
  - i. Phenotypic ratio of  $F_2$  plants (1mk)
  - ii. Genotypic ratio of  $F_2$  plants (1mk)
- c. Name a characteristic in humans which is controlled by multiple alleles. (1mk)
- d. Which is the biological term used to refer to the condition exhibited by  $F_1$  plants. (1mk)

380. The photograph below shows red blood cells that have been put in different solutions. Examine them and answer the questions that follow.



- a) i) Identify the type of solution in which F was placed. (1mk)
- ii) State the process which the red blood cells underwent in illustration G. (1mk)
- b) Account for the appearance the red blood cells underwent in illustration E. (3mks)
- c) Explain what would happen if plant cells are placed in the solution in which the cells in G were immersed. (3mks)

381. The diagram below shows blood circulation in a mammalian tissue.



- a. Name the parts labelled **P** and **Q**. (2mks)
  
- b. Name the substances that are:
  - i. Required for respiration that move out of capillaries. (1mk)
  
  - ii. Removed from tissue cells as a result of respiration. (1mk)
  
- c. Explain how substances move from the blood capillaries into the tissue cells. (3mks)
  
- d. Name **one** blood component that is not found in the part labeled **P**. (1mk)

382. a. The diagram below represents a member of kingdom Animalia.



- i. Name the phylum to which the organism belong. (1mk)
  
- ii. Using observable features in the diagram, give **three** reasons for the answer in 4a (i) above. (3mks)

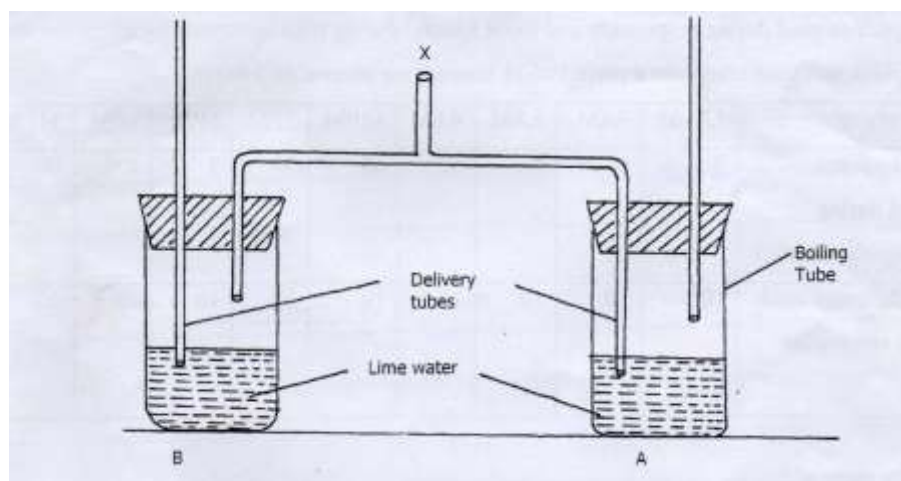


b. To estimate the population size of crabs in a certain lagoon, traps were laid at random. 400 crabs were caught, marked and released back into the lagoon on the first day. Four days later, traps were laid again at random. Out of the 374 crabs caught the second time, 80 were found to have been marked.

i. Calculate the population size of the crabs in the lagoon. (3mks)

iii. What is the name given to this method of estimating the population size? (1mk)

383. An experiment was set up as show below.



(a) A student blew air in and out through point X. Using arrows indicate how air gets in and out of the set up. (2mks)

(b) [i] In which of the tube would lime water form white precipitate first. (1mk)

ii] Give a reason. (1mk)

(c) What is the effect of lactic acid in the thigh muscle of an athlete after a short fast race?

(2mks)

(d) Identify the type of muscle in human being where the formation and effect of lactic acid is not felt. (1mk)

(e) What is the biological significance of boiling milk. [1mk]

384. An experiment was carried out to investigate the effect of temperature on the rate of reaction catalyzed by an enzyme. The results are shown in the table below.

Temperature <sup>0</sup> c	Rate of reaction in mg of product per unit time
5	0.2
10	0.5
15	0.8
20	1.1
25	1.5
30	2.1
35	3.0
40	3.7
45	3.4
50	2.8
55	2.1
60	1.1

(a) On the grid provided draw a graph of rate of reaction against temperature. ( 6marks)

(b) When was the rate of reaction 2.6 mg of product per unit time? ( 2 mks)

(c) Account for the shape of the graph between

(i) 5<sup>0</sup> C and 40<sup>0</sup> C ( 2 mks)

(ii) 45<sup>0</sup> C and 60<sup>0</sup>C ( 3 mks)

(d) Other than temperature name **two** ways in which the rate of reaction between 5<sup>0</sup>C and 40<sup>0</sup>C could be increased. (2 mks)

(e) (i) Name one digestive enzymes in the human body which works best in acidic condition ( 1 mk)

(ii) How is the acidic condition for the enzyme named in (e) (i) above attained? ( 2 mks)

(f) The acidic conditions in (e) (ii) above is later neutralized

(i) Where does the neutralization take place? (1 mk)

(ii) Name the substance responsible for neutralization (1 mk)

385. Describe:

- a. How the structure of mammalian heart is adapted to its function. (15mks)
- b. The process of blood clotting. (5mks)

386. a) After a meal of carbohydrate, the glucose level in the blood rose to  $150\text{mg}/\text{cm}^3$ .

Explain the role of the liver in bringing the sugar level down back to normal. (8mks)

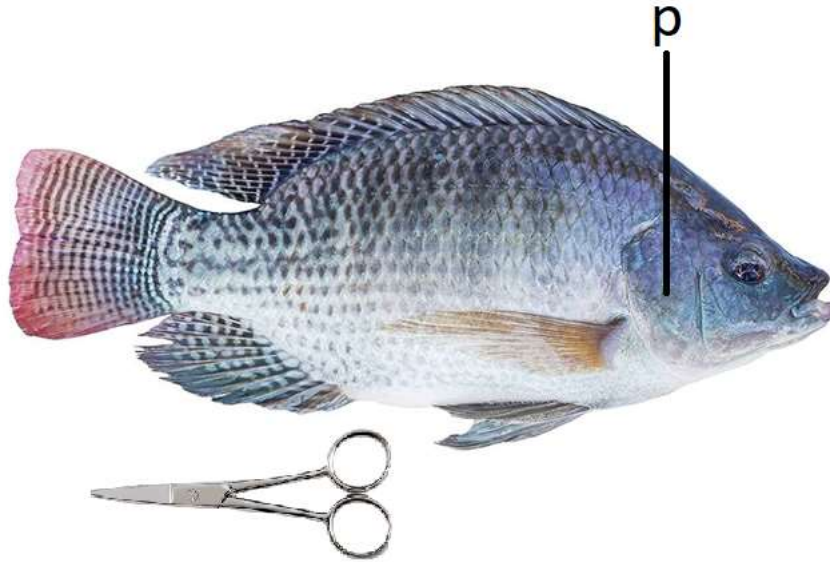
b) Explain six importance of plants excretory products. (12mks)

**SECTION C (232/3 BIOLOGY PAPER 3)**  
**{QUESTIONS 387-413}**

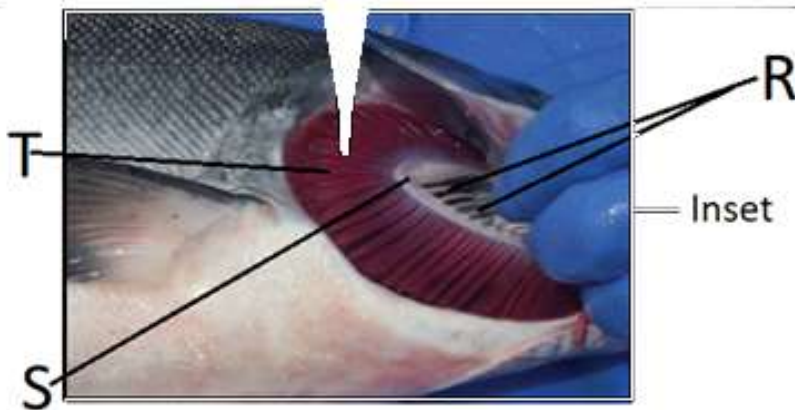
- 387.(a) You are provided with specimen labeled T. With reasons, state the mode of dispersal of the specimen. (2mks)
- b) Using a blade cut a transverse section.  
Draw a labeled plan diagram of the cut section. (4mks)
- Work out your magnification. (1mk)
- (b) State the type of placentation displayed by specimen, . (1mk)
- (c) Squeeze one-half portion of specimen T to obtain its juice into a clean beaker.  
Using the reagents provided and juice extracted from specimen T carry out food test. (6mks))

TEST	PROCEDURE	OBSERVATION	CONCLUSION

388. Below is a photograph of a fish. Examine it and answer the questions that follow.



- a) Classify the organism under the following. (3mks)
- i. Kingdom –
  - ii. Phylum –
  - iii. Class –
- b) The actual length of the pair of scissors next to the fish is 10.6cm. Using this information, calculate the actual length of the fish. (4mks)
- c) The photograph below shows structures visible after removing the part labelled P. The inset is a magnified view of one of the structures.
- d (i) Identify the part in the inset. (1mk)

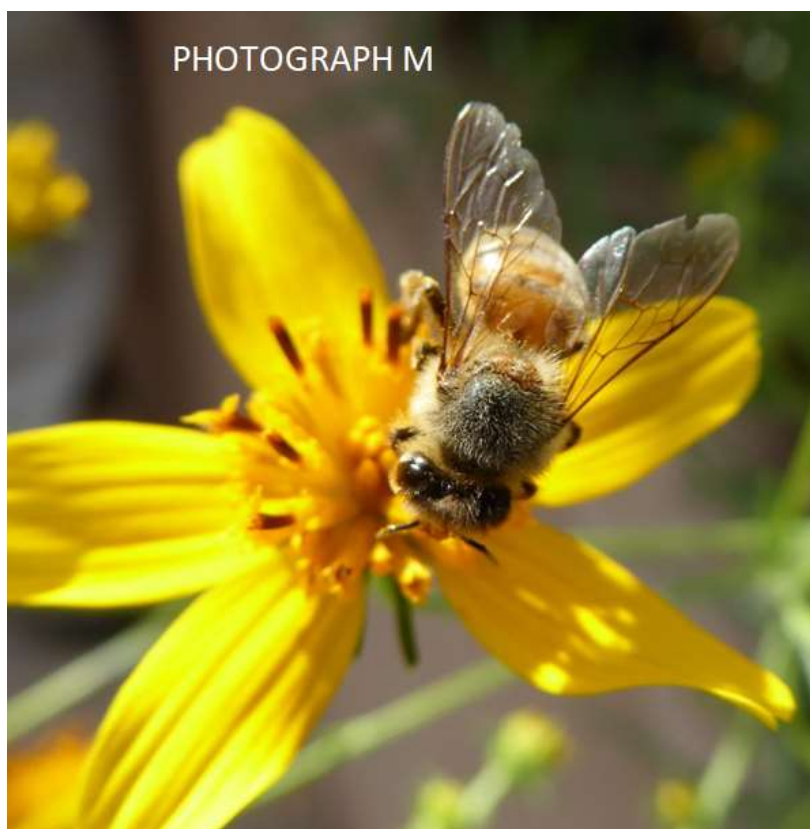


(i) Name the parts labelled R, S and T. (3mks)

(ii) Explain how each of the parts named in b) (i) above is adapted to its function. (3mks)

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





- (a) Name the relationship: -
- (i) Between A and C in Photograph W. (1mk)
- (ii) In photograph M. (1mk)
- (b) Explain your answer in a(ii) above (2mk)
- (c) What is the importance of the relationship taking place between A and C in the photograph W. (1mk)
- (d) Using observable features only, explain two ways in which the flower is adapted to the activity taking place in photograph M. (2mks)
- (e) (i) Give the biological term used to refer to the phenomenon captured in photograph W between organisms A and B towards C. (1mk)
- (ii) State two implications of the phenomenon mentioned in e(i) above. (2mks)
- (f)(i) State the class to which the flower in photograph M is obtained. (1mk)
- (ii) Give a reason for your answer. (1mk)

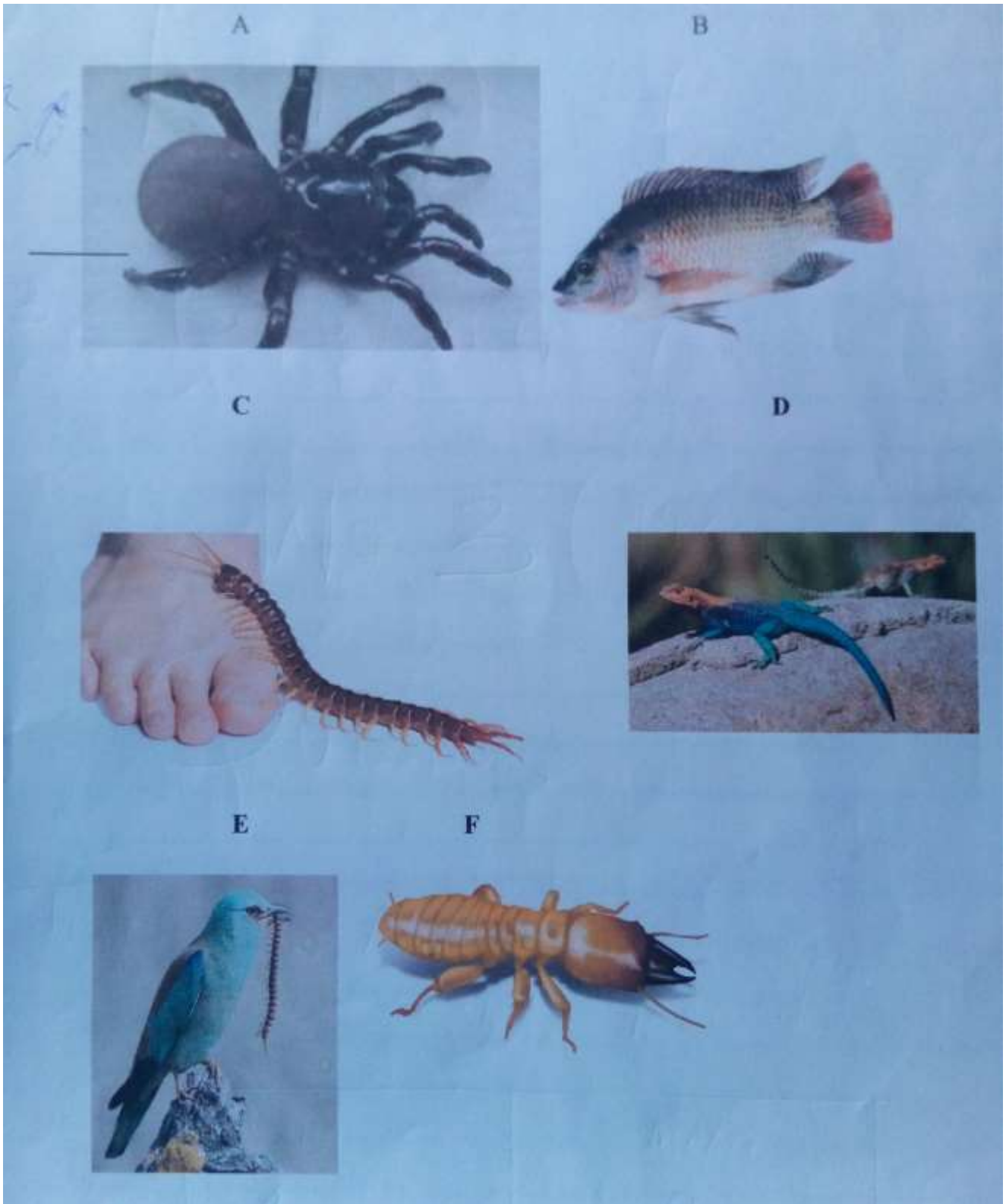


# **BIOLOGY PRACTICAL CONFIDENTIAL (QUESTIONS 390-392)**

**Each candidate shall require the following**

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

390. Study the organisms below



- a) Complete and use the key below to identify the organisms (2mks)
- 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 fins .....go 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 feathers ..... Aves
  - 7b) Has no feathers .....go to 8
  - 8a) Has a tail .....Reptilia
  - 8b) Has no tail .....Amphibia

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)

392. 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)

393. 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)

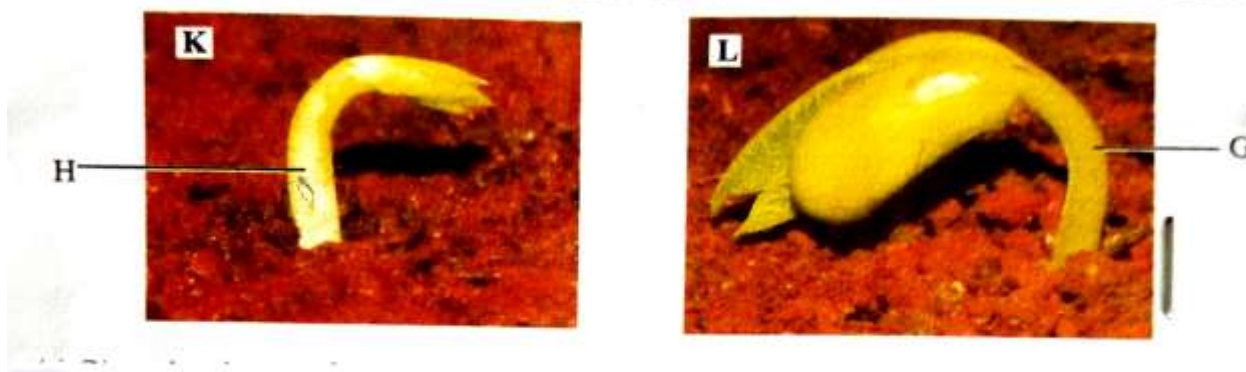
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## BIOLOGY PRACTICAL CONFIDENTIAL (QUESTIONS 393-395)

**Each student should be provided with the following**

- 25ml bicarbonate indicator
- Lime water
- A drinking straw
- 2 test tubes
- 10ml measuring cylinder
- A boiling tube
- Dilute hydrochloric acid
- Dilute sodium hydroxide

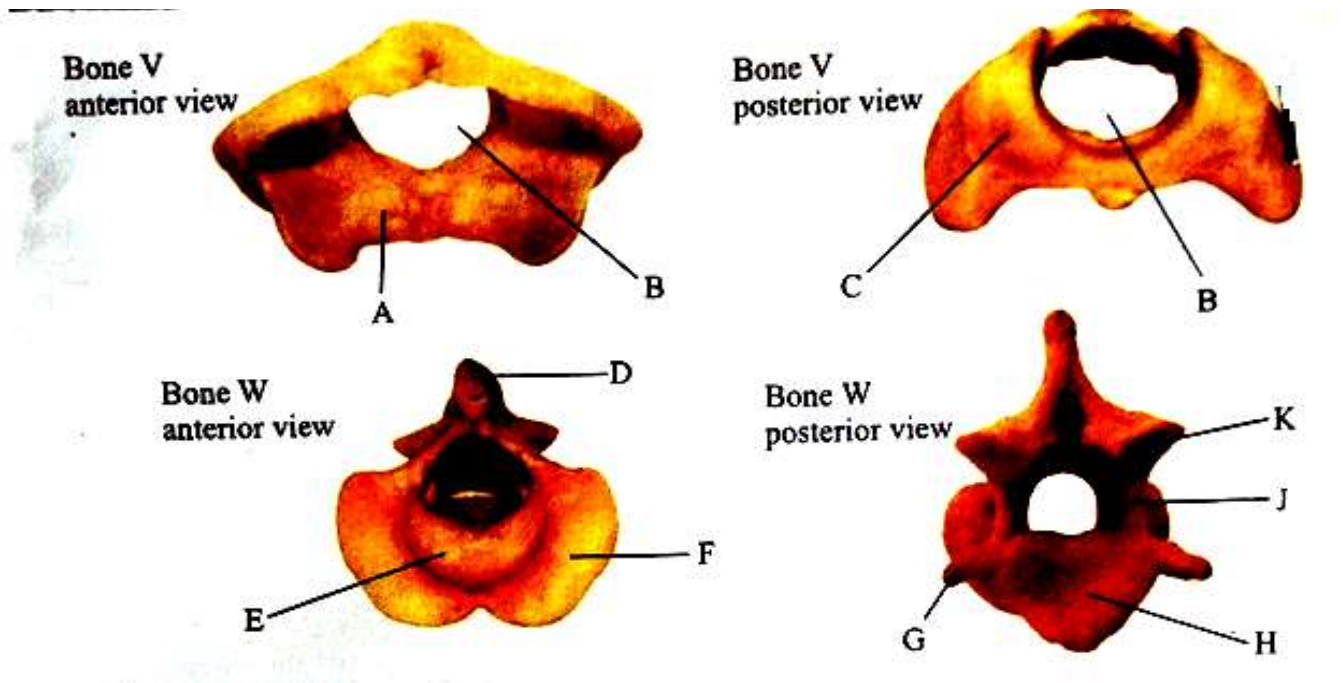
393. (a) Place 2ml of bicarbonate indicator in a clean test tube. Add dilute hydrochloric acid drop by drop and shake after each drop till there is a permanent color change.
- (i) State the resulting color 1mk
  - (ii) To the mixture obtained above, now add sodium hydroxide solution dropwise until there is a permanent color change. Record your observations 1mk
  - (iii) From your observations in a) i) and a) ii) above, what is the nature of the bicarbonate indicator 1mk
- (b) Place 10ml of a fresh bicarbonate indicator in boiling tube. Using a drinking straw, bubble air through the bicarbonate indicator until there is color change
- (i) Record your observation 1mk
  - (ii) What does the color obtained in b) i) above suggest about the nature of the gas breathed out 1mk
- c) Rinse the measuring cylinder and use it to place 2ml of lime water solution in a clean test tube. Rinse the drinking straw in (b) above and use it to bubble air through lime water solution
- (i) Record your observation 1mk
  - (ii) Suggest the identity of the gas that give rise to the observations above 1mk
- (d) (i) Name the physiological process in cells that leads to formation of gas named in (c)( ii) above 1mk
- (ii) Write down a word equation for the process named in (d) (i) above 1mk
  - (iii) What is the importance of the identified process in cells of living organisms 1mk
394. Below are photographs of two seedlings labeled K and L. Examine them.





- a) Given that the two plants belongs to the same class, name the class and give a reason based on the observable features in any of the two seedlings or both. 2mks  
 Class
- Reason(s)
- b) i) State giving a reason, the type of germination that occurs in each of the two seedlings 4mks  
 K  
 L
- ii) Explain how the two types of germination you have stated in (b) (i) above occur 2mks  
 K  
 L
- c) Name the parts labelled H and G on the seedling 2mks
- d) As germination progresses, both seedlings straightens. Explain how this occurs. 4mks
- e) Name the type(s) of root system that will develop in the two seedlings 1mk
- f) State another observation that will be made as seedling L straightens 1mk

395. The photographs below are specimens from the same animal of two different bones each shown in two views. Examine them.



- a) Identify the two specimens 2mks  
 Specimen V.....  
 Specimen W.....
- b) Give four observable differences between bones V and W 4mks

Bone V	Bone W

- c) Name the structure that articulates with part labeled A 1mk
- d) State two roles of opening labeled B 2mks
- e) Name the part labelled E and state its role 2mks
  - Name
  - Role
- f) Which of the labelled part(s) are used for articulation with adjacent vertebra 1mk
- g) State a common role of the parts labelled H and J 1mk
- h) Which of the labeled part(s) is(are) used for muscle attachment 1mk

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## BIOLOGY PRACTICAL CONFIDENTIAL (QUESTIONS 396-398)

231/3

Each candidate should be provided with the following:

- 10ml of Solution Q- A mixture of glucose, egg albumin and ammonia solution  
**(20gms of glucose + 10gms of egg albumin in a liter of 1M ammonia solution)**
- Distilled water in a 100ml beaker.
- Source of heat
- 2 test tubes.
- 10% sodium hydroxide solution.
- A glass rod.
- Visking tubing-8cm long.
- 1% copper sulphate solution.
- 2 threads/strings-about 5cm long.
- Benedict's solution.
- 2 labels
- A syringe enough to measure 10mls.
- 3 droppers

**NB-All photographs should be coloured**

396. You are provided with:

-Solution Q

-Distilled water in 100 ml beaker

-Visking tubing and two threads

-Glass rod

-2 test tubes and two labels

-Benedict's solution 10% sodium hydroxide solution and 1% copper sulphate solution.

PROCEDURE:

-Tie the visking tubing tightly at one end using the thread and put about 5ml of solution Q.

Tie tightly the other end ensuring that there is no leakage.

-Place the visking tubing in the distilled water in 100ml beaker and support it by tying the thread on a glass rod over the beaker.

- Allow the set up to stand for 30mins. Observe any changes in the visking tubing.

-Remove the visking tubing from the distilled water.

-Using a syringe draw about 5ml of the contents in the beaker labeled distilled water. Put it in the test tube and label it G. Repeat the same procedure to obtain 5ml of solution in the visking tubing, put in another test tube and label it H.

a) Using the reagents provided, carry out food tests to determine the components in substance G and H and fill the table below.

Substance	Food Test	Procedure	Observation	Conclusion
G				

H				

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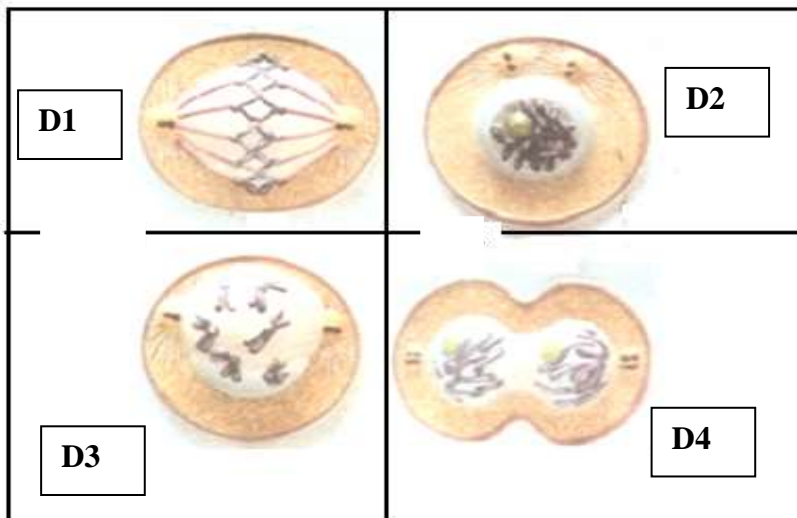
8marks

b) Substance Q is a urine sample obtained from a patient in a hospital laboratory. Name two conditions that the patient was suffering from. (2marks)

c) (i) What physiological activities that took place in the experiment you undertook above. (2mark)

Account for your answer in C (i) above. (2marks)

397. Study the photomicrographs below and use them to answer questions that follow.



a) Identify the type of cell division above. (1mark)

.....

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

c) With a reason identify each stage. (4marks)

Diagram	Stage	Reason
D1		
D2		
D3		
D4		



(d) The photographs below show two fruits and their half-sections.



- (i) Through which plane has the sections been cut? (1mark)
- (ii) State two differences between specimens S and T. (2marks)
- (iii) With reasons, in each case state the type of fruit and method of dispersals for specimen S and T. (2marks)

**Specimen S**

Type of fruit: .....

Reason:.....

Method of dispersal:.....

Reason:.....

**Specimen T**

(2mks)

Type of fruit:.....

Reason:.....

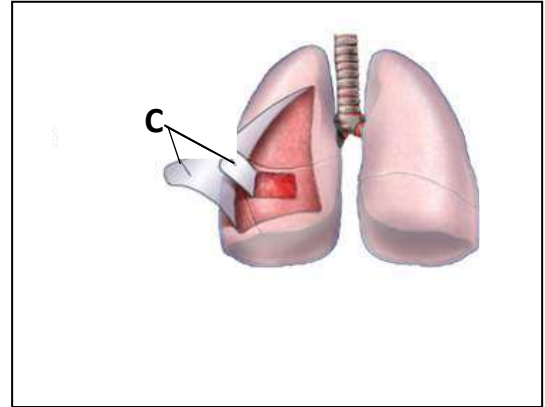
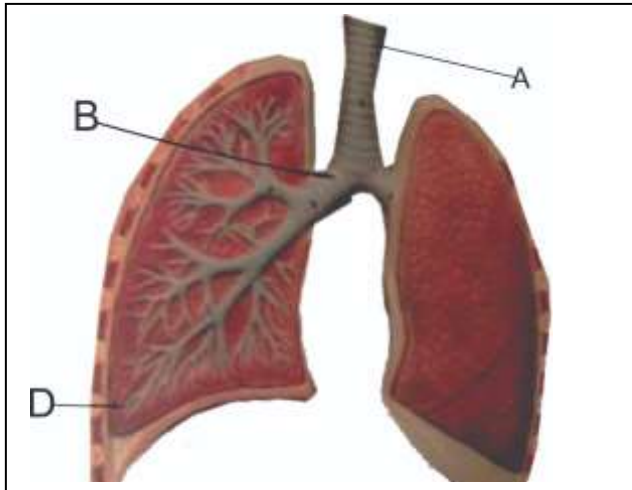
Method of dispersal:.....

Reason.....

(iv) Draw and label a diagram of cut specimens S.

(4marks)

398, Study the diagrams below and answer the questions that follow.



a) (i) Name the parts labeled A, B, C and D.

(4marks)

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

(2marks)

(iii) State **one** function of the part labeled C.

(1mark)

b) State **three** adaptations of the part labeled D.

(3marks)

# BIOLOGY PRACTICAL CONFIDENTIAL (QUESTIONS 399-401)

*Each candidate will require;*

- ❖ Specimen **R**- a piece of ripe lemon fruit
- ❖ 2mls of Benedict's solution with a dropper
- ❖ 2mls of Iodine solution with a dropper.
- ❖ 2mls of 10% Sodium hydroxide solution with a dropper
- ❖ 2mls of 1% Copper sulphate solution with a dropper
- ❖ Source of heat
- ❖ 3 test tubes in a rack
- ❖ 1 Droppers
- ❖ Scalpel/Razor blade
- ❖ Pestle and mortar
- ❖ 4mls DCPIP solution placed in a small beaker with a dropper
- ❖ 4mls of 0.1% solution of Ascorbic acid supplied in a boiling tube
- ❖ White tile
- ❖ Incisor tooth labeled as specimen **K**
- ❖ Premolar tooth labeled as specimen **L**

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

- Specimen **R**
- Iodine solution
- Benedict's solution
- Sodium hydroxide solution
- Copper sulphate solution
- Source of heat
- 3 test tubes in a rack
- Droppers
- Scalpel/Razor blade
- Pestle and mortar

Study the specimen **R** provided.

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

.....

- (b) With reasons, identify the method of dispersal for the specimen.

Method of dispersal (1 mark)

Reasons (2 marks)

- (c)
- By use of the scarpel provided, peel off the outer cover of the specimen **R** to reveal the inner juicy part.
  - Extract a small portion of the juicy part, place in a mortar and smash it using a pestle.
  - Decant the juicy extract from the crushed specimen **R** into a test tube.

- Divide the juicy extract from specimen **R** into two portions each 2cm<sup>3</sup> and use them as follows;

**Portion one**

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

Food substance	Procedure	Observation	Conclusion

**Portion two**

- (d) (i) To 1cm<sup>3</sup> of DCPIP in a test tube, add 0.1% solution of Ascorbic acid drop by drop until the colour of DCPIP disappears. Shake the test tube after addition of each drop. Record the number of droplets used. (1 mark)
- (ii) To another 1cm<sup>3</sup> of DCPIP in a test tube add the **portion two** drop by drop, shaking the test tube after addition of each drop until the colour of DCPIP disappears. Record the number of drops used (1 mark)
- (iii) From the results obtained in (d) (i) and (ii) above, calculate the percentage of Ascorbic acid in the juice obtained from specimen **R**. Show your working (2 marks)

**400.** (a) You are provided with specimens labeled **K** and **L** obtained from the same mammal.

- (i) Identify specimens **K** and **L** (2mks)
- (ii) State the functions of specimens **K** and **L**. (2mks)
- (iii) Give two adaptations of specimen **L** to its function. (2mks)
- (iv) Give two differences between specimens **K** and **L**. (2mks)

	Specimen K	Specimen L
(i)		
(ii)		

(b).Study the photographs below and answer the questions that follow.



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

**Specimen X**

Class ..... (1 mark)

Reason ..... (1 mark)

**Specimen Z**

Class ..... (1 mark)

Reasons ..... (2 marks)



(ii) Describe **two** adaptations of organism labeled Y to its habitat.

(2 marks)

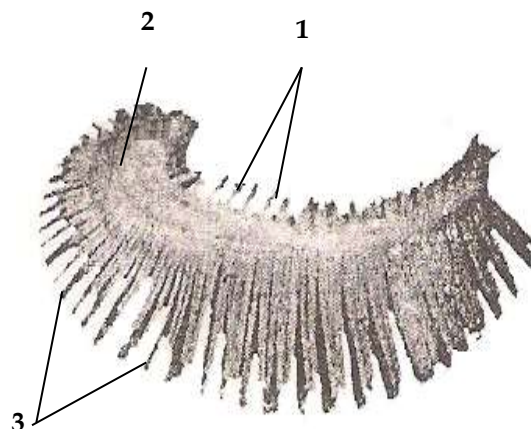


**401.** Below are photographs labelled W and J of organs obtained from different animals. The organs perform similar functions. Examine them

**Photograph W**



**Photograph J**



(a).(i) Identify the organs.

(2 marks)



Photograph J.....

K.....

(ii) Identify the following parts on photograph W? (2 marks)

**M** .....

**L** .....

(ii) Give **two** adaptations of the part labeled M on photograph W. (2 marks)

(b.) (i) Name the class to which the organs on **photograph J** was obtained from (1 mark)

(ii) Identify the parts labelled 1 and 3 in **photograph J**. (2 marks)

(c) Using **observable features**, state how the part **labelled 1** you identified in (b),(ii) above is adapted to its functions (1 marks)

(d) .State the general function performed by both organs. (1 mark)

# **BIOLOGY PRACTICAL CONFIDENTIAL**

## **(QUESTIONS 402-404)**

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.

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

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

Solution	Food	Procedure	Observation	Conclusion
Q				
R				

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

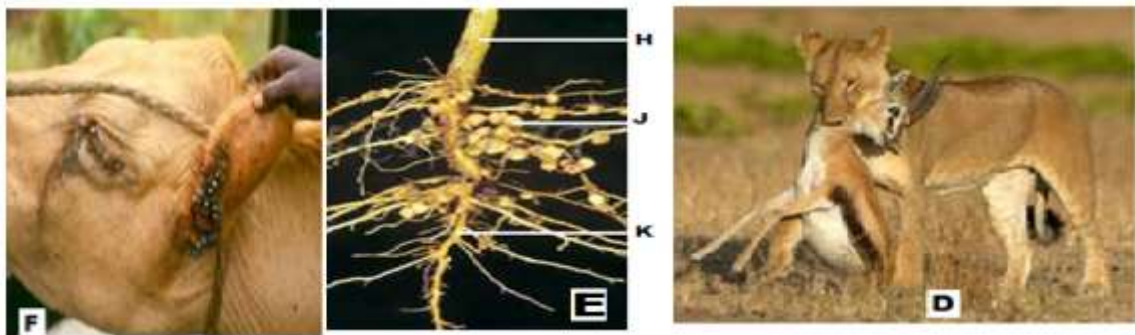
ii). Give a reason for your answer in b (i) above. (1mk)

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

(2mks)

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

403. 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)

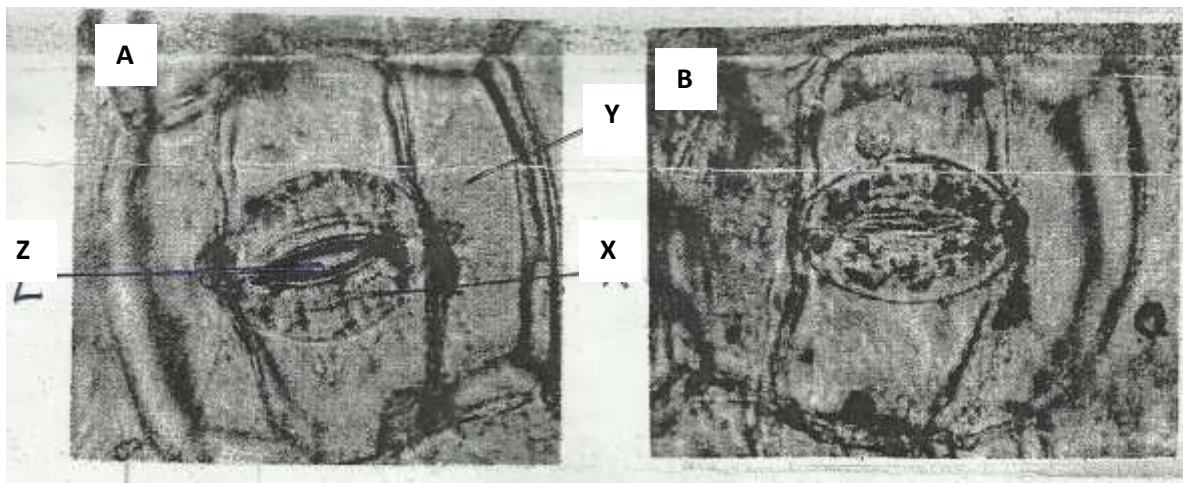
d) Explain how the relationship benefits a farmer. (2mks)

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)

404. 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)
- X
- Y
- 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)

## BIOLOGY PRACTICAL CONFIDENTIAL (QUESTIONS 405-407)

1. Each candidate should be supplied with the following

- (i) 4 test tubes in test tube rack.
- (ii) 1 boiling tube
- (iii) Iodine solution – supplied with a dropper
- (iv) Adequate distilled water
- (v) Benedict solution– supplied with a dropper
- (vi) Means of heating
- (vii) 10% Sodium Hydroxide– supplied with a dropper
- (viii) 1% Copper (II) Sulphate– supplied with a dropper
- (ix) DCPIP– supplied with a dropper
- (x) 10cm<sup>3</sup> of solution W in a boiling tube labeled as **solution W**

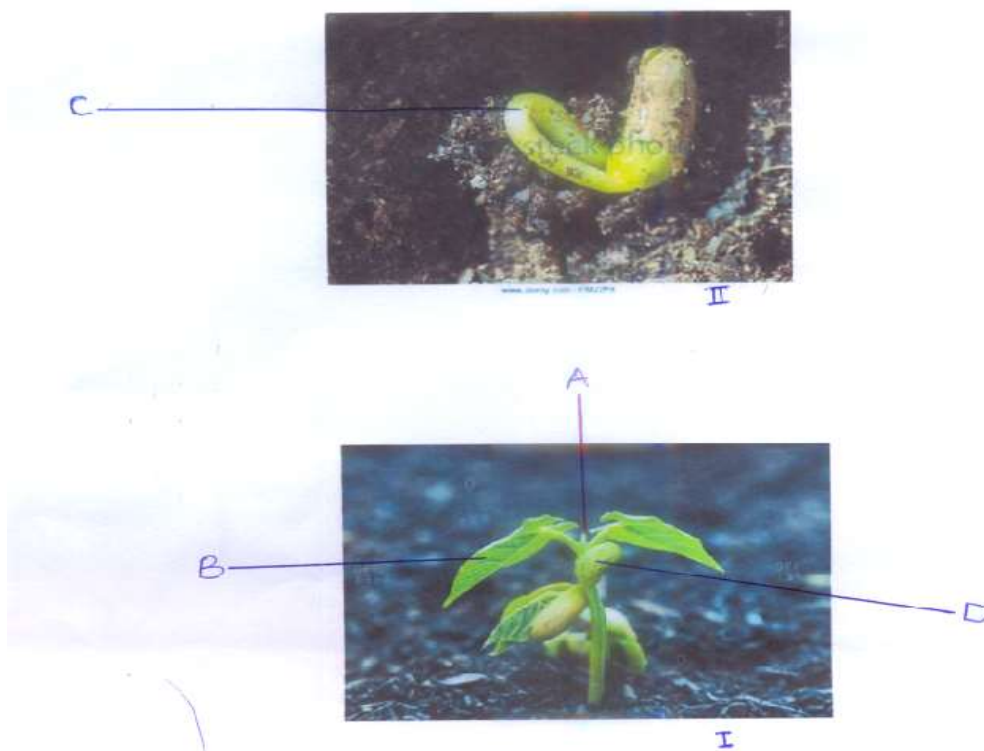
**NB:** measure 30gms of glucose and 15gms of egg albumen in a 500ml beaker, add 200cm<sup>3</sup> of distilled water and stir to dissolve. Top up with distilled water to make 500cm<sup>3</sup> solution. Label this solution as solution **W**

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

FOOD SUBSTANCE	PROCEDURE	OBSERVATION	CONCLUSION

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



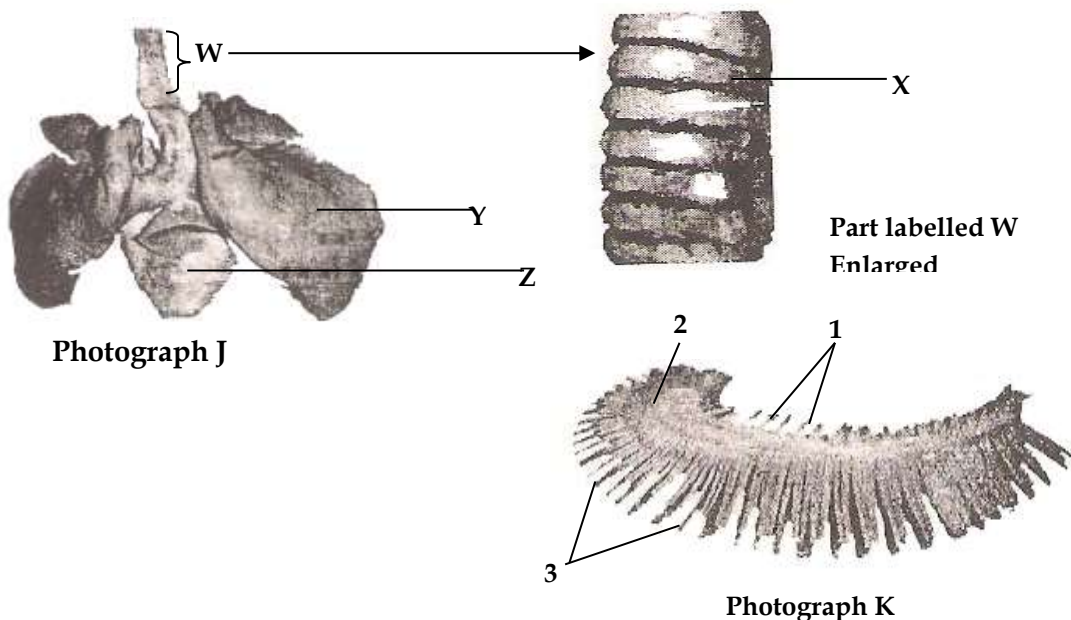
- a) Name the parts labelled A, C and D. (3 marks)
- b)(i) Name the class to which the specimen belongs. (1 mark)
- (ii) Give two reasons, using observable features to support your answer in (b) (i) above (2 marks)
- (c) Give two functions of the structure labeled D. (2 marks)
- d) Explain how the curvature labeled C is formed (3marks)
- e) Name the type of germination exhibited by the seedlings. Give a reason for your answer. (2marks)

Type

Reason



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



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

# **BIOLOGY PRACTICAL CONFIDENTIAL {QUESTIONS 408-410}**

In addition to the apparatus found in biology laboratory, each candidate should be provided with

1. Ripe Yellow/purple passion fruit labeled specimen J.
2. Dry black jack fruit labeled K.
3. Fresh green peas/bean pod labeled specimen L.
4. Hand lens.
5. 3ml of DCPIP.
6. Dropper.
7. 50ml beaker.
8. Filter funnel.
9. Stirring rod.
10. One test tube.
11. Test tube rack.

**NOTE:**

**THE PHOTOGRAPHS IN THE QUESTION PAPER MUST BE COLOURED.**

408. you are provided with specimens J, K and L.

a) (i) identify specimen J. (1mk)

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

b) Using the scalpel provided, carefully make a cross section of specimen J.

i) name the type of placentation (1mk)

ii) extract juice from specimen J and test it for vitamin C. (3mks)

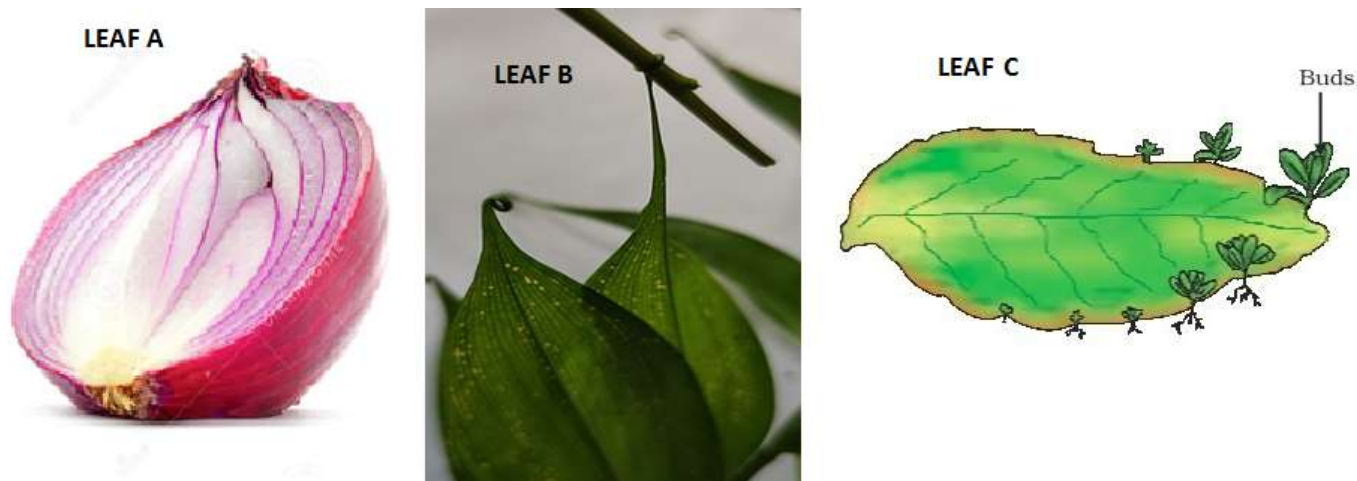
Food tested	Procedure	Observation	Conclusion

c) complete the table below using the specimens provided. (9mks)

specimen	Agent of dispersal	One adaptation of the specimen
J		-
K		-

L		-
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409. The photographs below represents leaves from different plants. use them to answer the questions that follow.

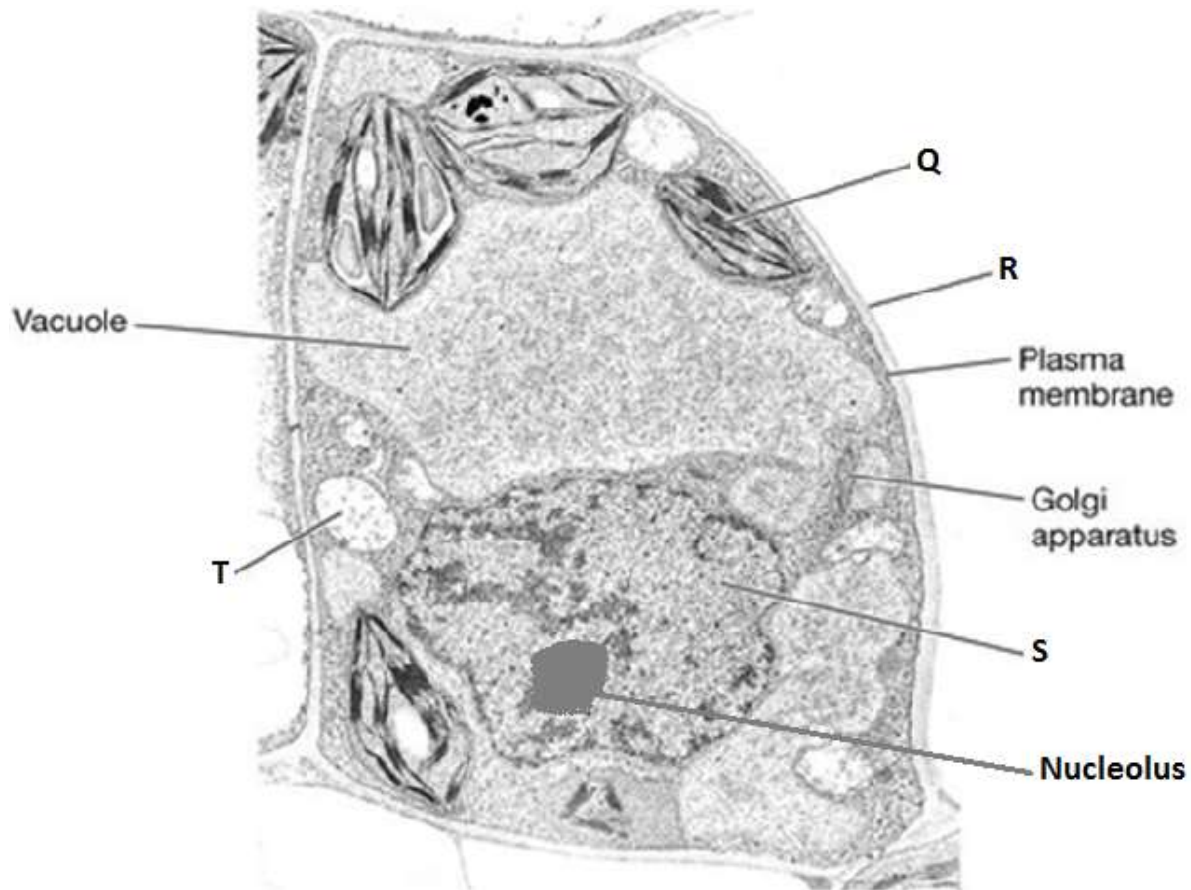


a) Each of the leaves A,B and C are modified to perform different functions. With a reason, state the functions. (10mks)

LEAF	FUNCTION	REASON
A		
B		
C		

- b) State the type of evolution that may have led to the emergence of the different leaves shown in leaf A, B and C. (1mk)
- c) Name the type of evolution structure represented by the leaves above. (1mk)
- d) Name two examples of such structures as named in (b) (ii) above in aves. (2mks)

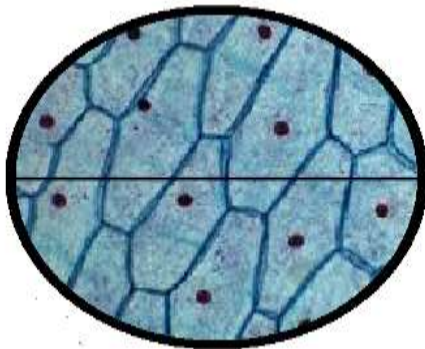
410. Below is a photomicrograph of a plant cell. Study it and answer the questions that follow.



- a) (i) Label the parts labeled R, S and T. (3mks)  
 ii) Name the chemical compound that constitutes part labeled R above. (1mk)
- b) State the function of part labeled  
 i) Q. (1mk)  
 ii) Nucleolus. (1mk)
- c) Below is an enlarged micrograph of organelle T.



- i) What is the function of organelle T.? (1mk)  
 ii) What is the biological significance of having numerous parts U in organelle T.? (1mk)
- d) A student observed onion epidermal tissue using a microscope whose field of view was \_\_\_\_\_ mm in diameter as shown below. Calculate the approximate width of one of the cells. (3mks)



# **BIOLOGY PRACTICAL CONFIDENTIAL (QUESTIONS 411-4113)**

**Each student will require the following**

1. 3 test tube.
2. 10ml measuring cylinder
3. 50ml plastic beaker
4. Specimen Q (a ripe Orange)
5. Sharp scalpel.

**Access to (These should be fully identified appropriately)**

1. DCPIP
2. 10% NaOH solution
3. 1% CuSO<sub>4</sub> solution with dropper.
4. Iodine solution with dropper.

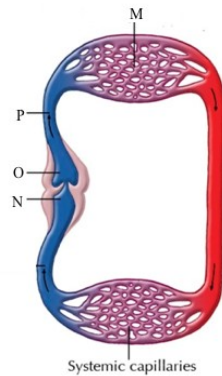
411. You are provided with Specimen **Q**
- a) Name the part that develops into specimen **Q** (1mark)
  - b) Cut specimen **Q** longitudinally to obtain two separate halves. Draw a surface of the cut specimen and label a seed and pericarp. (4marks)
  - c) From the cut sections of specimen **Q** gently squeeze some juice into clean beaker labelled substance **R**

Using the reagents provided, test for the food substance in substance **R**  
(12marks)

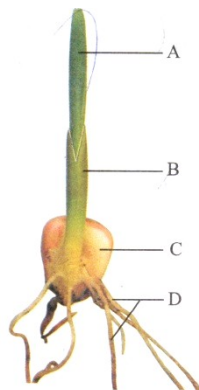
Food substance	Procedure	Observation	Conclusion



412. Below is a representation of the circulatory system in Fish.



- a) With reference to the diagram, classify fish into the following taxa.
- i. Kingdom (1mark)
  - ii. Phylum (1mark)  
Reason (2marks)
  - iii. Class (1mark)  
Reason (2marks)
- b) Name the parts labelled M,N,O and P (4marks)
- c) (i) State the type of circulation present in fish shown above (1mark)  
(ii) Give a reason for your answer (1mark)
413. The photograph below is that of a plant seedling. Examine it.



- (a) Using observable features, Name the class to which the specimen belongs.

Class

(1mark)

Reason.

(3marks)

(b) State the function of the parts labelled **A,B,C** and **D**

(4marks)

PART	FUNCTION
A	
B	
C	
D	

(c) Name the type of germination and give reason of the above diagram.

(2marks)